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THESIS

**UNDERSTANDING HOW PROGRAM MANAGERS SUCCESSFULLY
MANAGE INNOVATION IN MAJOR DEFENSE ACQUISITION
PROGRAMS (MDAPs): AN EXPLORATORY STUDY**

by

Benjamin P. Stinson

March 2001

Thesis Advisor:

Nancy C. Roberts

Associate Advisor:

Brad Naegle

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MANAGE INNOVATION IN MAJOR DEFENSE ACQUISITION PROGRAMS
(MDAPs): AN EXPLORATORY STUDY**

Benjamin P. Stinson
Captain, United States Marine Corps
B.S., Oregon State University, 1991
MPA, University of Oklahoma, 2000

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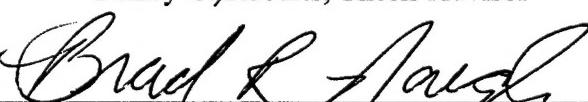


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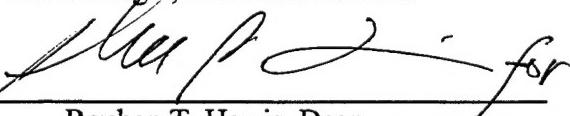
Approved by:



Nancy C. Roberts, Thesis Advisor



Brad Naegle, Associate Advisor



Reuben T. Harris, Dean
Graduate School of Business and Public Policy

ABSTRACT

Senior DoD leadership, under the banner of acquisition reform, seek change in the acquisition process and within acquisition programs to reduce program cycle-time and total ownership cost. Key to achieving acquisition reform is the program manager (PM). PMs are tasked with the overall responsibility for their program's cost schedule and performance goals. The DoD 5000 Series encourages PMs to, "continually search for innovative practices that reduce cycle-time, reduce cost, and encourage team-work", yet little is contained in the DoD 5000 Series or any other acquisition documents to assist the PM in understanding or achieving innovation. In this exploratory study, the author chose five previous PMs known for successful innovation and interviewed them about their innovations. In an effort to aid future PMs, interview data are compared and analyzed to produce preliminary acquisition innovation "best practices".

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I. INTRODUCTION

A. BACKGROUND

The Department of Defense (DoD) continues to search for ways to improve the acquisition process. Why? Many studies have found that most defense acquisition programs fail to meet cost and schedule objectives (Cancian, 1995; Holland, 1998; Laurent, 1998; Stinson, 2000; and Thompson & Jones, 1994). The Under Secretary of Defense for Acquisition, Technology and Logistics (USD AT&L) has addressed this deficiency by declaring cost and cycle-time reduction the primary focus of current acquisition reform initiatives (Gansler, 1998).

Many of the laws, regulations and policies governing the defense acquisition process have been rewritten to support acquisition reform. Arguably, the most important DoD acquisition regulation is what is referred to as the DoD 5000 series documents. It has two basic parts, DoD 5000.1, Defense Acquisition, and DoD 5000.2-R, Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MIAS) Acquisition Programs (DoD, 1996a; DoD, 1996b). The first, DoD 5000.1, states the policies and principles for all DoD acquisition programs and identifies key acquisition officials and forums. Additionally, it authorizes DoD 5000.2-R and, in accordance with OMB Circular A-109, it establishes a “disciplined yet flexible management approach for acquiring quality products that satisfy the operational user’s needs” (DoD, 1996a, p.1). The second, DoD 5000.2-R, establishes “a simplified and flexible management framework for translating mission needs into stable, affordable, and

well-managed...[defense] Programs" (DoD, 1996b, p.1). It contains the mandatory procedures applicable to all defense programs.

One of the keys to achieving acquisition reform goals (reduced cycle time and reduced cost) appears to be innovation, as alluded to in much of the recent literature written about defense acquisition. (See Revolution in Military Affairs (RMA) (Gansler, 1998), Revolution in Business Affairs (RBA) (Gansler, 1998), internet-based acquisition (Dunn, 1998), Alpha Contracting (Schutter, 1998), Single Process Initiative (SPI) (Bergan, 1997). The premise of all of these reform efforts is to change from current practices and try something new (i.e., innovate) to achieve acquisition reform goals.

Knight (1967) describes the process of innovation as "a special case of the process of change in an organization." The term innovation thus can be used in several contexts. In one case, it is synonymous with invention, or the creation of a new configuration from two or more previously existing concepts (Zaltman, Duncan & Holbek, 1973). In another, it is used to describe the process whereby an idea becomes innovation through a process of adoption and internalization (Zaltman, Duncan & Holbek, 1973). Thirdly, innovation can refer to "that idea, practice, or material artifact that has been invented...independent of its adoption or non-adoption" (Zaltman, Duncan & Holbek, 1973, p.8). This thesis will focus on innovation as either a process or a product. I will use Mohr's (1969) classic definition of innovation: "the successful introduction into an applied situation of a means or ends that are new to that situation."

B. PURPOSE

Central to accomplishing Acquisition Reform goals is the program manager (PM). The role of the program manager (PM) in the defense acquisition process is found in the DoD 5000.1. To summarize, it states the PM is has overall responsibility for the cost, schedule and performance objectives of the program. Additionally, it “encourages PMs to continually search for innovative practices that reduce cycle time, reduce cost, and encourage teamwork” (DoD, 1996a, p.7). Little is contained in the entire DoD 5000 Series to assist the PM in understanding or achieving innovation.

If we are to achieve acquisition reform goals, PMs will have to find more innovative “ends” and “means” within defense acquisition programs. How do PMs successfully manage innovation in defense acquisition programs? Information and assistance regarding innovation in defense acquisition programs is needed to provide the PM with a framework to understand innovation. PMs must understand their role as a public entrepreneur who moves an innovative idea through a process to achieve innovation. They also must be aware of the barriers to innovation, and strategies used in defense acquisition programs to achieve innovation.

My thesis will focus on the PM as a public entrepreneur. I will attempt to identify strategies used by PMs to complete an innovation. In this exploratory study, I will interview subjects (PMs) who have demonstrated innovation in their programs. Through comparison and analysis of subjects’ responses to interview questions, I hope to provide innovation “Best Practices” or heuristics to assist future PMs in managing innovative programs.

C. RESEARCH QUESTIONS

The primary research question of this thesis is: **How do program managers (PMs) successfully manage innovation in defense acquisition programs?**

Secondary research questions include:

1. Who innovates in major defense acquisition programs?
2. What kinds of innovations occur in defense acquisition programs?
3. What are the barriers to innovation in defense acquisition programs?
4. Do PMs use strategies to innovate? If so, what strategies are employed by PMs? What are the relationships between their strategies, innovations and barriers?

D. SCOPE

This thesis includes a review of organizational innovation and public entrepreneurship theory. From this review, generalizations regarding innovation in DoD acquisitions can be made and subject interview questions developed. Analysis of the interview subjects' responses provides comparisons among subjects and comparisons to generalizations formulated from the literature. The thesis concludes with recommendations and program management "rules of thumb for innovation" to aid future PMs.

According to Snider (2000, p.22), thesis research involving responses from program managers and other acquisition professionals contain "findings that have practical as well as theoretical significance." It is described as the theory-practice

connection (Snider, 2000). In addition to increasing the acquisition lessons learned body of knowledge, I anticipate this research will assist the PM in the formulation and execution of successful innovation plans.

E. METHODOLOGY

This thesis research consisted of the following steps:

1. An extensive literature search of books, magazine articles, CD-ROM systems, and other library information resources.
2. A review of organizational innovation, public entrepreneurship, and change agent theories.
3. The development of interview questions to obtain data to answer primary and secondary research questions.
4. A review of the major defense acquisition programs (MDAPs) that involved innovation. The identification of PMs associated with the innovation. The selection, if possible, of subjects formally recognized for innovation, or whose program received formal recognition as being innovative.
5. Personal interviews with the chosen subjects. (All but one was conducted face-to-face; the exception was a phone interview.)
6. Analysis of subject responses. Identification of individuals involved in innovation, their strategies, and barriers to innovation.
7. Comparison of subjects' responses were compared with theory drawn from the literature review and to one another.

8. Data analysis and summary of the heuristics to aid future PMs.

F. ORGANIZATION OF THE STUDY

Chapter I, *Introduction*, specifies the need for PM innovation to achieve DoD's acquisition reform goals. In addition, this chapter outlines the primary and secondary research questions, the study's scope and methodology, and presents an overview of the thesis.

Chapter II, *Literature Review*, provides definitions of innovation and public entrepreneurship. It discusses defense acquisition programs from the perspective of theories of organizational innovation and public entrepreneurship. The process of achieving innovation from idea to organizational integration and acceptance (innovation) is examined. The concept of a public entrepreneur as the agent that moves an idea through the innovation process is reviewed.

Chapter III, *Methodology*, describes the research methodology used to conduct this study.

Chapter IV, *Data*, summarizes the responses of each interview subject.

Chapter V, *Analysis*, discusses, compares and analyses the subjects' responses to interview questions. PM innovation heuristics and lessons learned are developed and formalized.

Chapter VI, *Conclusions and Recommendations*, restates primary and secondary research questions, summarizes findings and states research limitations. Finally, recommendations for further study are offered.

II. LITERATURE REVIEW

A. INTRODUCTION

Innovation requires both an innovative idea and someone to promote the idea. There are two interrelated but distinct processes at work (Roberts and King, 1996). The first process is when an idea develops into a full-blown innovation. The second is the process of entrepreneurship, when an entrepreneur engages in certain activities to move the idea from inception to organizational practice. This chapter provides an overview of innovation in organizations and public entrepreneurship noting the relationship between the two processes.

B. ORGANIZATIONAL INNOVATION

Many definitions of innovation exist in the literature. It is important for this thesis to define innovation as it relates to PMs and defense acquisition programs. It is also important to describe the various types of innovation and the phases an idea progresses through to become innovation.

1. Innovation Defined

Knight (1967, p.479) describes the process of innovation as “a special case of the process of change in an organization. The two differ only in the novelty of the outcome.” The term innovation can be used in several contexts. In one case, it is synonymous with invention, or the creation of a new configuration from two or more previously existing concepts (Zaltman, Duncan & Holbek, 1973). In another, it is used to describe the process whereby an idea becomes innovation through a process of adoption and internalization (Zaltman, Duncan & Holbek, 1973). Thirdly, innovation can refer to “that

idea, practice, or material artifact that has been invented...independent of its adoption or non-adoption" (Zaltman, Duncan & Holbek, 1973, p.8). Zaltman, Duncan and Holbeck's first two definitions of innovation are most relevant to the nature of this study. Because this thesis will focus on innovation as either a process or a product, I will use Mohr's (1969, p.112) classic definition of innovation: "the successful introduction into an applied situation of a means or ends that are new to that situation."

2. Innovation and Organizations

Most relevant to this exploratory study is theory that focuses on the specifics of public organization's acceptance of innovation, although theories describing innovation in any organization that exhibits bureaucratic behavior are relevant. Innovations and organizations have quite a paradoxical relationship; organizations resist innovations, yet they need them to change and survive.

Generally, public organizations resist innovation (Balk, 1995; Davenport, 1993; Wilson, 1989) and we ought not be surprised at this fact since innovation, which includes some degree of uncertainty and instability, is contrary to the organization which favors stability and routine practices (Wilson, 1989). Those organizations with a strong sense of mission have a greater resistance to innovation (Wilson, 1989), since the novel idea initially challenges the status quo and introduces risk or uncertainty in accomplishing the mission. One could argue that there are very few places with as strong a sense of mission as the U.S. military. Wilson (1989) posits that incremental (consistent with current task definitions) are more likely to be accepted than drastic innovations (innovations which require a change in task definitions).

Innovation occurs in different branches of our Government. Innovation associated with laws or statutes is described as innovation by legislative design. Innovation through interpretation of law is considered innovation by judicial design. And lastly, innovation associated with a policy or program within a public bureau is referred to as innovation by organization or management design (Roberts, 1999). Since the PM functions within a public bureau, the Department of Defense, innovations in defense acquisition programs are by organization or management design.

3. Degrees of Innovation

The literature on organizational innovation suggests two extremes of innovation with varying orders of magnitude in-between: incremental and “Big Bang” innovation, Gluck (1985). Davenport, a recognized expert on innovation, (1993) labels the first as process improvement and the more extreme as process innovation. Gluck’s and Davenport’s models can be combined on the same innovation continuum as depicted in Figure 1.

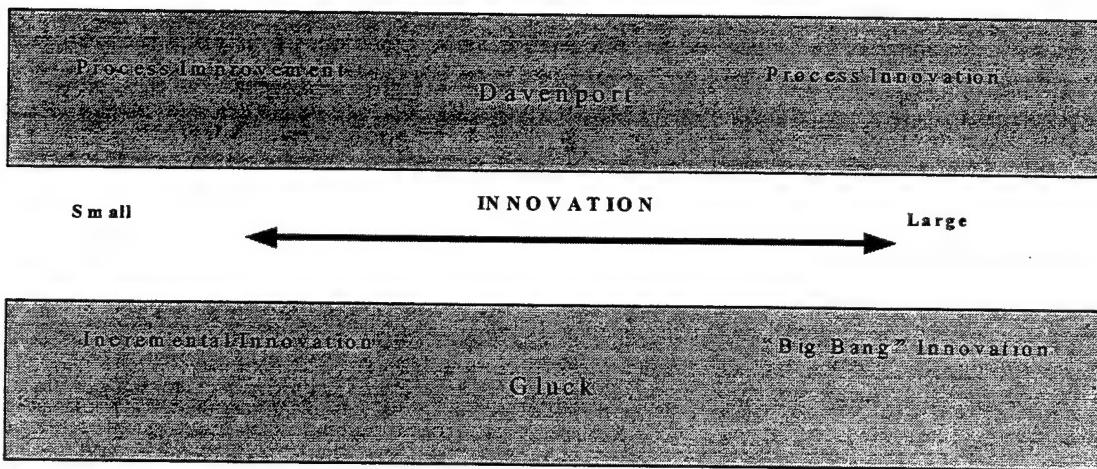


Figure 1. Innovation Continuum

Davenport (1993, p.11) further defines the difference between the two ends of the innovation spectrum by providing characteristics of proposed innovation and corresponding indicators to determine the magnitude of innovation achieved (see Figure 2.) According to Davenport (1993), the larger the process the greater the potential for radical benefit.

	Improvement	Innovation
Level of Change	Incremental	Radical
Starting Point	Existing Process	Clean slate
Frequency of Change	One-time/continuous	One-time
Time Required	Short	Long
Participation	Bottom-up	Top-down
Typical Scope	Narrow, within functions	Broad, cross-functional
Risk	Moderate	High
Primary Enabler	Statistical control	Information technology
Type of Change	Cultural	Cultural/structural

Figure 2. Process Improvement Versus Process Innovation
 (From: Davenport's "Process Improvement versus Process Innovation", *Process Innovation*, 1993, pg. 11 [Fig 1-3].)

Unfortunately, measuring the degree of innovation is a very subjective task requiring more research and in-depth analysis than is provided in this thesis. Although such analysis of defense acquisition innovation would provide interesting and challenging research, it is beyond the scope of this thesis.

4. Innovation Phases

The development of a new idea, from initiation or inception to organizational acceptance or implementation, follows a discernible trajectory that can be divided into three distinct phases: initiation, design and implementation (Roberts, 1992; Roberts & King, 1996). Usually a need or problem within an organization spawns the innovative

idea; this signifies the beginning of the initiation phase. The second phase, development or design, is characterized by a refinement of the idea; a translation of the idea into tangible solutions or benefits for the organization. Prototypes of the idea might exist in this phase. Finally, during implementation, the idea is accepted and put into practice by the organization. This phase continues until the organization decides to keep or reject the idea. “If it survives this process, we know it as innovation” (Roberts, 1999, p.92).

Others suggest that the development of an idea is not so linear or sequential. Some ideas follow paths that loop back to other phases (Schroeder et al., 1989) and still other ideas can display characteristics of more than one phase at once, suggesting simultaneous paths through an organization (Pelz & Munson, 1982). Regardless of the path the idea takes, the literature generally agrees that the idea progresses through distinct developmental stages. This thesis will use the three phases: initiation, design and implementation, posited by Roberts (1992) and Roberts and King (1996), to describe the development of defense acquisition program innovations.

C. PUBLIC ENTREPRENEURSHIP

The subject of public entrepreneurship has received much attention in recent literature. Arguably, public entrepreneurship has reached Government “buzzword” status as a result of Osborne and Gaebler’s widely read book, *Reinventing Government: How the Entrepreneurial Spirit is Transforming the Public Sector* (1992). But like many buzzwords used today, the term “public entrepreneurship” is often misunderstood. As it relates to defense systems acquisition and PMs, what does public entrepreneurship mean? Who are the people we refer to as public entrepreneurs, and how do they innovate?

1. Public Entrepreneur Defined

Like innovation, the public entrepreneurship literature contains many definitions. This thesis uses the Roberts and King (1996) definition. “We refer to innovators who promote new public policy as *public entrepreneurs*—individuals who introduce, translate, and implement an innovative idea into public practice” (Roberts & King, 1996, p.10).

2. Characteristics of a Public Entrepreneur

The literature on public entrepreneurship is in agreement that the public entrepreneur displays traits of persistence, creativity, tenacity, self-confidence, charisma, decisiveness and political astuteness (Doig & Hargrove, 1987; Kingdon, 1984; Ramamurti, 1986; Robert & King, 1996). Public entrepreneurs differentiate themselves from maintainers, intellectuals, champions and administrators by engaging in the innovation process from initiation to successful implementation (Roberts and King, 1996). In fact, they are credited with “supply[ing] the energy to move the innovative idea through the various phases of the innovation process.” (Roberts 1999, p.92)

Innovations are not always propelled through organizations by individual entrepreneurs. “Entrepreneurship has its collective form as well...[i]ndividual entrepreneurs can join forces and work as a team with other entrepreneurs to push an idea through all phases of the innovation process” (Roberts 1999, p.93). Roberts (1999) also found that the entrepreneurial process associated with organizational innovation followed collective and individual forms, as opposed to legislative innovation, which often follows

the collective form. The PM then, has the option to choose either the collective or individual form of entrepreneurship to achieve innovation.

3. How does a Public Entrepreneur Innovate?

The literature describes two conflicting courses of action, or modes, for public entrepreneurs who innovate in organizations. One mode advises the public entrepreneur to innovate through trial and error or “groping along” (Behn, 1988, Golden, 1990). The other mode suggests that the public entrepreneur should “systematically analyze and plan their way through the innovation process” (Roberts, 1999, p.89). Sanger and Levin (1992) argue that the first approach yields only incremental or evolutionary innovation, because the entrepreneur is only modifying existing practices. The second approach to innovation, due to its strategic and systematic development, yields innovation of a revolutionary nature (Roberts, 1992; Roberts and King, 1996; Roberts, 1999). Using Davenport’s (1993) innovation comparison model, the “groping along” mode would only produce process improvement, not process innovation as it involves only incremental changes to the status quo.

Through case studies of innovation by management or organization design Roberts (1999) finds the mode that best describes innovation by public entrepreneurs in the organizational setting is that of “groping along”.

Here is where the nature of the innovative idea becomes important. Entrepreneurs in public bureaus are incrementalists. Their comfort zone and ideas do not take them far from modest adjustments to the status quo. Pushing ideas that represent incremental change has the advantage of provoking minimal resistance from the organizational members and stakeholders, which in turn requires comparatively few resources to sustain the

entrepreneurial effort. Seen in this light, groping along is energy efficient and compatible with the resource-limited world of public bureaus. (Roberts, 1999, p.106)

D. CHAPTER SUMMARY

Innovation and public entrepreneurship are two, inter-related but distinct, processes (Roberts and King, 1996). The first is the process of innovation, when the idea moves through various stages to become accepted practice. The second is the process of entrepreneurship, when the public entrepreneur develops certain strategies and tactics to move the idea through time. Figure 3 provides an illustration of this concept.

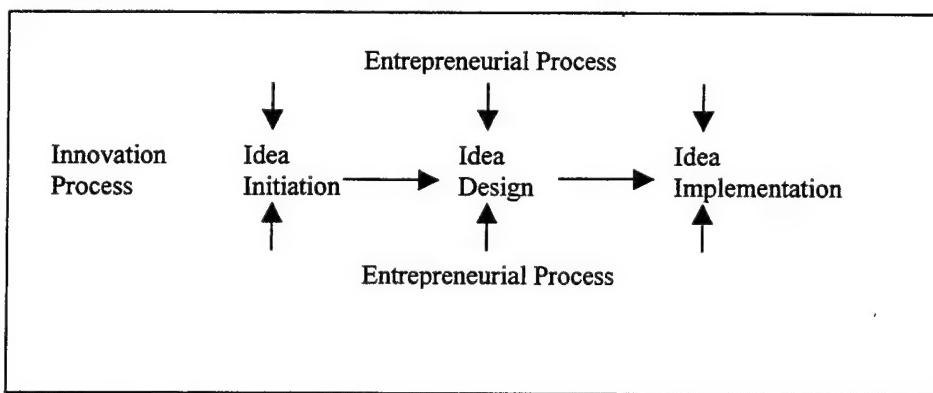


Figure 3. Conceptual Map of the Change Process
(From: Source: Roberts & King, 1996, p.225, figure C.1.)

PMs, by virtue of their place in the DoD acquisition organization, manage innovation in an organizational or managerial context. Innovation by organization design could take either a collective or individual form. But it is usually associated with the incremental or groping along mode of entrepreneurship (Roberts, 1999). Thus, we should find that PMs innovate in defense acquisition programs through individual or

collective means and their innovations are achieved through trial and error or “tinkering”.

The resulting changes due to their innovations are expected to be incremental.

III. METHODOLOGY

A. INTRODUCTION

This chapter summarizes the methodology used in the study. The research purpose is described, followed by the research methods. This chapter concludes with a summary of the steps used in conducting the study.

B. RESEARCH PURPOSE

The focus of this thesis is on the program manager—a key figure in achieving DoD acquisition reform goals. The objective is to develop a set of heuristics to assist future PMs, by studying the actions of those who successfully managed innovative programs. Little is written to help program managers innovate--yet they are tasked with doing so in the DoD 5000 Series. Detailed analysis of successful defense acquisition innovations will not only help future PMs, but also assist DoD in achieving reform goals that require nothing less than innovation.

C. EXPLORATORY STUDY

1. Overview

Since the primary research question to be answered is "how" PMs manage innovation in their programs, the best means to answer the question is the use of in-depth cases. However, in-depth cases were not practical for this thesis due to resource constraints (the limitations and suggestions for further study can be found in Chapter 6, *Recommendations and Conclusions*.). Instead, I chose to interview five innovators in Major Acquisition Defense Programs (MDAPs). These interviews should be considered

exploratory. Their purpose is to identify major themes and issues for more systematic investigation of public entrepreneurship and innovation in the future.

2. Units of Analysis

One of the most important components of a research design is the unit(s) of analysis. Unit(s) of analysis define the focal point of study and determine the limits of data collection and analysis (Yin, 1994). This thesis explores two units of analysis: the PM as a public entrepreneur and an innovative idea implemented in practice (defined as an innovation).

3. Development of Interview Questions

Interview questions evolved from the secondary research questions. Some interview questions pertain to multiple secondary research questions. Interview questions and their relationship to secondary research questions are depicted in the following matrix. (Figure 4.)

Secondary Research Questions	Related Interview Questions
1. Who innovates in major defense acquisition programs (MDAPs)?	1. Describe an innovation you made as a PM from "inception" to full implementation. 13. Did you inherit any innovative ideas from the previous PM? If so were you able to achieve them? Why or why not? 14. Did you leave any unfinished innovation attempts for your successor? 15. Do you consider yourself creative? An entrepreneur?
2. What kinds of innovations occur in major defense acquisition programs (MDAPs)?	1. Describe an innovation you made as a PM from "inception" to full implementation. 2. What were the pros and cons of the new innovation? 11. Were compromises a part of getting the innovation accepted? What were they? How much compromise of the original innovation was needed to achieve acceptance? How did you compromise? 12. Where did the innovation originate? Was it borrowed from another area or context? 17. How much time did you devote to the innovation?
3. What are the barriers to innovation in major defense acquisition programs (MDAPs)?	3. What were the attitudes of your superiors, peers and subordinates toward your innovation? How did they change over time? 8. Who were the innovation's opponents? 9. How did you handle the opponents? 16. What were the biggest barriers to achieving the innovation? 17. How much time did you devote to the innovation?
4. Do PMs use strategies to innovate? If so, what strategies do they use? What are the relationships between their strategies, innovations, and barriers?	2. What were the pros and cons of the new innovation? 3. What were the attitudes of your superiors, peers and subordinates toward your innovation? How did they change over time? 4. Did you have a formal or informal plan to achieve this innovation? If so describe. How did the plan change over time? 5. Did you develop some sort of proto-type for the innovation? (e.g., computer program, pilot program, model) 6. Who were the innovation's proponents? 7. How did you use the proponents to help you? 8. Who were the innovation's opponents? 9. How did you handle the opponents? 10. Did your innovation work as anticipated? 11. Were compromises a part of getting the innovation accepted? What were they? How much compromise of the original innovation was needed to achieve acceptance? How did you compromise?

Figure 4. Relationship Between Research and Interview Questions

4. Choosing Study Subjects

Interview subjects were chosen based on their reputation for having successfully innovated as a PM. DoD has established several programs to recognize defense acquisition programs and acquisition individuals who demonstrate innovation. The

Defense Certificate of Recognition for Acquisition Innovation was established to allow the service Component Acquisition Executive (CAE) and Undersecretary of Defense for Acquisition Technology and Logistics (USD(AT&L)) principals to recognize innovative acquisition practices. The David Packard Excellence in Acquisition Award is presented annually to the DoD civilian or military organization, group or team whose “significant contributions...demonstrated exemplary innovation and best acquisition practices” (DoD, 2000 webpage).

In addition to DoD awards, the Army awards the honor of Program Manager of the Year to the PM(s) who best accomplishes DoD, Army, and program acquisition goals. Although the award does not explicitly state innovation is one of the criteria for selection it is implied, based on the accomplishments of past recipients.

I chose five PMs associated with programs that received one or more of these awards during, or as a result of, their tenure with the program. One of the five PMs chosen received the Army's Program Manager of the Year Award.

All were PMs of Acquisition Category I (ACAT I) programs. ACAT I programs are Major Defense Acquisition Programs (MDAPs) or programs designated ACAT I by the Milestone Decision Authority (MDA). An MDAP is an acquisition program, that is estimated by DoD to require an eventual total expenditure for research, development, test and evaluation (RDT&E) of more than 355 million in fiscal year (FY) 1996 constant dollars or, for procurement of, more than 2.135 billion in FY 1996 constant dollars (DoD 5000 Series, 1996a).

5. Interviews

The data were collected through in-person interviews (with the exception of one telephonic interview) using a standard questionnaire. A total of five interviews were conducted. The interviewees included PMs from the Army, Navy and Marine Corps. They ranged in rank from a retired Colonel to a newly selected Vice Admiral.

The interviews took 90 minutes on average; the shortest interview lasted 60 minutes and the longest approximately 120 minutes. Interview subjects were informed prior to the interview that they would be asked about innovations that occurred while they were a PM. None of the subjects are currently PMs. I studied each program, during the subject's tenure, prior to the interview, but I did not know prior to conducting the interview the innovation the subject would discuss.

The interviews were conducted in the following order: MG Snider, 20 July 2000; COL Matthews, 27 July, 2000; RDML Johnston, 10 August 2000; VADM Dyer, 21 August and 23 August 2000 (two separate phone conversations); and, BGen Feigley, 13 September 2000.

D. CHAPTER SUMMARY

This is an exploratory study, due to resource constraints. An interview method was used to address primary and secondary research questions. The following table (Figure 5.) summarizes the steps used in conducting this study.

1.	Identify and analyze of primary research question.
2.	Conduct a review of organizational innovation and public entrepreneur literature.
3.	Develop interview questions for subjects to validate theory and obtain data to answer primary and secondary research questions.
4.	Conduct a review of major defense acquisition PMs associated with innovation. Select successful PMs as subjects.
5.	Arrange for and conduct personal interviews with subjects.
6.	Analyze subjects' responses. Identify those involved in innovation, strategies used, and barriers to innovation.
7.	Compare subjects' responses with theory developed in the literature review.
8.	Compare subjects' responses with one another.
9.	Develop generalizations and summarize data.
10.	Develop a set of heuristics to aid future PMs.

Figure 5. Summary of Methodology

IV. DATA

A. INTRODUCTION

This chapter presents and discusses the data collected to understand innovation in defense acquisition programs.

A brief description of each interview subject and his respective program is provided, followed by a summary of each individual's responses to the questionnaire. The descriptions and questionnaire responses are presented in order of current military rank.

B. DESCRIPTION OF INTERVIEW SUBJECTS AND THEIR PROGRAMS

1. Vice Admiral Dyer and the F/A-18 E/F Super Hornet Program

At the rank of Captain, VADM Dyer was assigned as the PM for the F/A-18 E/F program from 1994 to 1997. The program was in the end of its Engineering and Manufacturing Development (EMD) phase. The program team received the first DoD Acquisition Excellence Award and the Collier Award.

The F/A-18 E/F program resides in the PMA-265 office with the programs responsible for the F/A-18 A through D models and Foreign Military Sales (FMS). The F/A-18 E/F, also called the Super Hornet, is the nations newest strike fighter. It can be configured for one or two pilots. The Super Hornet is an adverse-weather, day and night, multi-mission strike fighter with significant survivability features over its predecessors, the F/A-18 A through D models. It is 25% larger than the previous airframe, but with 46% fewer parts (Boeing webpage, 2001). The increased size allows for greater fuel capacity, extending its mission radius by up to 40%. The Super Hornet has entered full-

rate production through a multi-year contract that will result in a minimum purchase of 548 aircraft in 2010 (Boeing webpage, 2001).

2. Major General Snider and the RAH-66 Comanche Program

MG Snider was advanced to the rank of Brigadier General when he was assigned the responsibilities of the Comanche PM in August of 1994. While still in the Program Definition and Risk Reduction (PDRR) phase, MG Snider entered the program as the Secretary of Defense cancelled its production funding, reducing it to an industrial and technology-based program. He served as the Comanche PM until June 1997.

The RAH-66, known as the Comanche, is the planned replacement to the OH-58, OH-6, OH-58D and AH-1 helicopters and is the Army's number one priority program. It will be incorporated into the Army's air cavalry and reconnaissance units, and as a scout for the AH-64 Apache it will be incorporated into heavy division and corps attack helicopter battalions. It features a crash-worthy and ballistically tolerant airframe; significantly reduced radar cross-section derived from the fuselage shape and internally carried weapons; and, the capability to recognize and identify targets and digitally transmit the information to battlefield commanders in near real-time (Galindo, 2000).

3. Brigadier General Feigley and the AAV Program

BGEN Feigley's joined the Advanced Amphibious Assault Vehicle (AAV) program in 1988 as the Assistant Program Manager, while he held the rank of Major. He remained with the program for the better part of ten years, ending his stint in 1998 at the rank of Colonel, having been the PM since 1994. The program was designated a Direct Reporting Program in 1993, placing the program directly under the Defense Acquisition

Executive (DAE), the Undersecretary of Defense for Acquisition and Technology (USD (A&T)). The AAAV program has received two Packard Awards, an Innovative Technology Award, two Reduction of Total Ownership Cost (R-TOC) Awards and three Meritorious Unit Commendations.

The AAAV is closely tied to the signature mission of the Marine Corps. It is designed to provide over-the-horizon maneuver capability for a combat-loaded Marine infantry squad at 20-25 knots in the water and the same speed and agility of the M-1 tank over land. It features an NBC over-pressure system, modular armor, and a 30mm turret gun with growth capabilities to 40mm. Its engineering design has been largely influenced by total ownership cost (TOC) principles. It replaces the aging fleet of Assault Amphibian Vehicles. The Marine Corps plans to purchase a little over 1000 AAAVs by 2012 (DoD webpage, 2001b).

4. Rear Admiral Johnston and the JSOW Program

From August 1996 to April 1999, RADM Johnston was assigned as the PM for the Joint Standoff Weapon (JSOW). He held the rank of Captain during his tenure with the JSOW program. The program includes three variants of the weapon. Each variant was in different acquisition stages while RADM Johnston was PM. The JSOW program received the Daedalian's Weapon System Award and the Defense Acquisition Executive Certificate of Achievement.

JSOW is considered a family of air-to-surface glide weapons in the 1000-lb range. Its design makes it kinematically efficient, providing standoff capabilities from high and low altitudes. JSOW can be used against both land and sea targets, but operates outside

of enemy point defenses giving the warfighter what is described as "standoff precision engagement" capabilities (OSD webpage, 2001a). This is accomplished through the use of Global Positioning System (GPS) and Inertial Navigation System (INS) coupling. The weapon was designed to be delivered from the F/A-18 E/F, so it too is day/night and all weather capable. The three variants differ by the type of warhead that is attached to the weapon and the precision of the guidance system. It can be employed via Navy, Marine and Air Force aircraft (OSD webpage, 2001a).

5. Colonel Matthews and the ATACMS Program

In April of 1990 COL Matthews joined the Army Tactical Missile System (ATACMS) program as the PM. He led the program until April of 1994. During his tenure the program successfully completed two milestone reviews and was successfully deployed during Desert Storm while still in a limited production status. COL Matthews was awarded the honor of Army Program Manager of the Year for 1991.

ATACMS is a long-range, supersonic, surface-to-surface, guided missile. It is fired from the Multiple Launch Rocket System (MLRS). It engages targets deep in the Joint Force Commander's Area of Responsibility (AOR). The missile accurately delivers an anti-personnel/anti-materiel warhead with multiple fragmentation bomblets. The program consists of different evolutionary "blocks". Each progressive block improves the accuracy and the range of the missile. This is accomplished through a GPS guidance system for in-flight position updates and a reduced, but more effective, payload of Brilliant Anti-armor Technology (BAT) sub-munitions (U. S. Army webpage, 2001).

C. INTERVIEW SUMMARIES

1. Vice Admiral Dyer and the Competency Aligned Organization

Innovation

VADM Dyer's innovation was a new way to manage defense acquisition programs. The innovation was called the Competency Aligned Organization. His innovation created a team-based organization that integrated functional experts involved in the program. Team members were now administratively and physically collocated under the leadership of the PM. Beginning in June 1995 the F/A-18 Strike Fighter program consolidated full life cycle responsibility for the acquisition of naval aircraft and associated weapons systems in the individual program manager

The idea originated from a study group in 1992-1993, involving VADM Dyer (then Capt Dyer) and approximately eight other Navy acquisition professionals. The concept was to create a team from the functional areas of the matrix support establishment and assign the team to the program manager so he could have full control over his program's cost, schedule, and performance objectives.

VADM Dyer described the old way PMs managed their programs. The PM had to "hire" specialists from the organizational matrix much the same way a general contractor builds a house. If something went wrong in a specific area of the program it was usually the responsibility of the specialists in that area to fix it, i.e., if something was wrong in the engineering aspect of the program the engineer department in the matrix had to fix it. The PM shared in the blame for the delay caused by the problem. The PM had to go up through the command chain several levels to involve senior leadership in resolving the

conflict. This innovation provided both the integrated approach needed to successfully field complex weapon systems, and the program manager the control he needed to be responsible for the task.

2. Major General Snider and the Program Redesign Innovation

MG Snider began his job as the Comanche PM with a need to innovate. Just before his assignment, the Comanche program lost two billion dollars of funding--relegating it to an industrial technology-based program status to preserve the technology. His innovation used a team approach to brainstorm program redesign options to create a new program timeline and funding schedule. His innovation also featured a new partnership agreement with the contractor that shortened the delivery time of two prototype aircraft. The consequence of the innovation was the restoration of two billion dollars to the Comanche Program Objective Memorandum (POM). Delivering the prototype flying aircraft early simulated the interests of the user, and demonstrated to program critics the program's technology risks were manageable.

This innovation is interesting because the Office of the Secretary of Defense (OSD) cut the program but Army maintained it was a high acquisition priority. MG Snider was faced with finding a tactful, political way of changing the Comanche program in the eyes of OSD to gain back the funding loss of two billion dollars. As a result of the redesign he led, the program received all of its initial funding in FY1995 and a \$100 million plus up in FY1996.

3. Brigadier General Feigley and the Collocation Innovation

BGen Feigley is credited with creating the first Government-contractor collocated program office for a MDAP. The idea surfaced during the Concept Exploration phase, prior to the award of the phase I contract. Collocation of the management offices was actually stipulated in the Request for Proposal (RFP), so it would be a requirement for the winning offeror. The idea was also related to the IPPD concept. BGen Feigley believed collocation was needed to make the IPPD process work.

The idea was to create an industry-Government partnership to share Government knowledge of an AAAV-like system. He described "sociological perspective" achieved through collocation by sharing information face-to-face. It had to be more than just a sharing of data and reports. The best way to do this was also collocation.

4. Rear Admiral Johnston and the Missile Warranty Innovation

RDML Johnston's innovation was to include in the JSOW contract a warranty for every JSOW unit purchased by the Navy. This required a shift in the maintenance responsibility from the Navy to the contractor. The contractor would become more concerned about the actual reliability of the system, since they would bear the added cost of maintenance if the actual reliability dropped below the contractor's advertised reliability.

His innovation would make the manufacturer responsible for the performance of the weapons system for the life of the system. The contractor would be responsible not only to identify and correct latent defects ten or twenty years into the lifecycle, but also to retrofit the existing inventory with the reliability upgrade. The contractor was not

comfortable with the unlimited liability introduced by the warranty so RDML Johnston's team proposed a cap to reduce the contractor's liability in the event the missile experienced unforeseen catastrophic problems. The cap was set at \$50 million.

RDML Johnston succeeded in innovating by showing how the warranty would be cost effective (pay for itself) within a few years. He demonstrated to decision-makers how the warranty cost (1.5% of the unit cost) could influence contractor behavior and save money in the future, through production of a higher quality weapon system.

5. Colonel Matthews and the Blanket Travel Orders Innovation

COL Matthews became frustrated with constant administrative burden of providing orders for the members of his program team. With over 100 Government employees on his program, 10-20 employees were on travel at any one time. Travel requirements often arose with little notice, due to the nature of the ATACMS program. Short fused travel requests required enormous effort, from both program secretaries and travelers, to ensure the necessary travel arrangements were made.

COL Matthews happened to read an article in a Government R & D magazine that described a TQL initiative used by another acquisition program to make travel easier. The process was called "blanket travel orders". Individuals were given travel orders that were valid for an entire fiscal year (FY). His idea was to use that same innovation in his program. He succeeded in creating "blanket travel orders" for personnel, GS-11 and above, in his program. Eventually all programs within his organization used blanket travel orders.

D. SUBJECT RESPONSES TO INTERVIEW QUESTIONS

1. Vice Admiral Dyer's Responses to the Questionnaire

Question 1. Describe an innovation you made as a PM from "inception" to full implementation.

Beginning in June 1995 the F/A-18 Strike Fighter program consolidated full life cycle responsibility for the acquisition of naval aircraft and associated weapons systems in the individual program manager. The concept was called the Competency Aligned Organization. In the case of the F/A-18, the program was divided into three integrated program teams, one for currently fielded F/A-18 C & D models, one for Foreign Military Sales and one for the new F-18 E/F upgrade. Each of the three integrated program teams is comprised of multiple integrated product teams, teams formed around a specific tangible product requested by the fleet.

The idea began as a study group in 1992-1993, involving VADM Dyer (then CAPT Dyer) and approximately 8 other Navy acquisition professionals. The concept was to create a team from the functional areas of the matrix support establishment and assign the team to the program manager so he could have full control over his program's cost, schedule and performance objectives.

VADM Dyer described the old way PMs managed their programs. The PM had to "hire" specialists from the organizational matrix much the same way a general contractor builds a house. If something went wrong in a specific area of the program it was usually the responsibility of the specialists in that area to fix it, i.e., if something was wrong in the engineering aspect of the program the engineer department in the matrix had to fix it.

The PM shared in the blame for the delay caused by the problem. The PM had to go up through the command chain several levels to involve senior leadership in resolving the conflict. This new idea provided both the integrated approach needed to successfully field complex weapon systems, and the program manager the control he needed to be responsible for the task.

Question 2. What were the pros and cons of the innovation?

He described the "pros" as:

- (a) closer to total, program and organizational optimization
- (b) ability to reach back quicker to functional expertise
- (c) creates a climate for integrated problem solving

The "cons" were described as:

- (a) a change in the way of doing business will meet resistance
- (b) could carry the team idea too far--too much empowerment
- (c) group tendencies--like "going native"--could stifle good judgement
- (d) loss of control by leaders or functional groups
- (e) expertise is diluted, one individual from a functional group working and issue

Question 3. What were the attitudes of your seniors, peers and subordinates toward your innovation? How did they change over time?

VADM Dyer's seniors were familiar with the origins of the innovation. He described the attitude of VADM Lockhard, the Commander of Naval Air Systems Command (NAVAIR), as cautious and supporting of the innovation in the Super Hornet

program as a prototype. His peers were described as apprehensive and showed some positive support. They too were held hostage by the old way of business (matrix support). He described his subordinates as "the most courageous of all". They supported the innovation even though they were torn between the team in the PM office and their old matrix office.

Question 4. Did you have a formal or informal plan to achieve this innovation? If so, describe. How did the plan changeover time?

Since the idea of teaming was intended for all of NAVAIR, the F-18 program office (PMA-265), as the largest NAVAIR program shop with over 1000 government employees across the US, was seen as the linchpin to achieving the innovation. If successful in PMA-265, within NAVAIR the "gravity would shift" in favor of the teaming concept.

VADM Dyer knew this as the F-18 E/F PM. He gave considerable thought to his choice of leaders to head the top tiers of teams within the office. His leadership choices were other Navy 0-6s and GM-15s. They were chosen to help manage the program and the innovation.

VADM Dyer specifically mentioned retired Navy Captain, Jim Keen, who wrote a handbook with the tier leaders, which became the PM's specific operating guide. Mr. Keen had no other duties on the program except training the program staff to work in teams.

The overall goal was to broadcast the change to the program office, communicate the new idea to the masses. When asked about strategies if the idea did not work VADM

Dyer stated that "off-ramps" were talked about but were not followed through due to idea's success.

Opponents and proponents were identified during the idea's origination and in devising a plan for the implementation.

Question 5. Did you develop some sort of prototype for the innovation? (e.g., computer program, pilot program, model)

PMA-265 was the prototype for all of NAVAIR. Prior to implementing it in the F-18 PM office, only a conceptual model was elaborated.

Question 6. Who were the innovation's proponents?

VADM Dyer identified the innovation's proponents as the Commander of NAVAIR, VADM Lockhard; the Deputy COMNAVAIR, a civilian SES; for the most part the Engineering Matrix; and, the contractor leader for Boeing/Mac Air, Mike Sears.

Question 7. How did you use proponents to help you?

He assisted VADM Lockhard in writing a letter to the command. It was sort of a policy letter, from the commander, directing the need to change the way of business, and acknowledged the fears associated with the change (what about the individual's ties back to matrix competencies). This letter "put heat on the dissenters" and created peer pressure to make the idea work on the leadership level above the PM (matrix leaders).

Question 8. Who were the innovation's opponents?

Legal, contracts, and logistics matrix organizations resisted the idea.

Question 9. How did you handle opponents?

He used proponents, who included senior leadership, to pressure "opponents to get on board"; for instance he drafted policy memo for release by VADM Lockhard (described in #7 above).

Question 10. Did the innovation work as anticipated?

VADM Dyer stated the results of the program show that it did. In his own words it "was one of the most successful major defense programs", and was "on cost, on schedule and on performance". He felt others thought so too, since it received the first DoD Acquisition Excellence Award, and the Collier Award.

Question 11. Were compromises a part of getting the innovation accepted?

Yes. He originally wanted IPT concept to extend down into the aviation depot community to cover all life cycles of the program. VADM Dyer admits he had to exclude the depots to get the idea through because changing the culture of the depot at the same time was too difficult. He believed it was the right compromise at the time.

Question 12. Where did the innovation originate? Was the innovation borrowed from another area or context?

A group of eight or nine senior officers met in 1992 or 1993. The idea originated out of six months of group discussions focusing on the need to change the way of doing things because of changes in the environment, e.g., end of Cold War, downsizing. The old way was simply not working (cost and schedule overruns). The group saw a need to "fix the burning bridge".

Question 13. Did you inherit any innovative ideas from the previous PM? If so were you able to achieve them? Why or why not?

He inherited a good foundation to the program, e.g., good tools and a sound contract award structure. Had a number of "smart guys" to look at the program and offer advice.

VADM Dyer stated that innovation comes from the marriage of both an idea and a person, this person needs a "streak of stubborn maverick".

Question 14. Did you leave any unfinished innovation attempts to your successor?

Yes, bringing the IPT concept to the depot organizations.

Question 15. Do you consider yourself creative? An entrepreneur?

He considers himself an "integrator", if this is creative, then yes. He believes that by Navy bureaucratic standards he is an entrepreneur. You create the perception of being an entrepreneur if you champion ideas that are "too new".

Question 16. What was the biggest barrier to achieving the innovation?

He described two barriers to his innovation: shifting of power and decision authority (from matrix to PM) and inertia of the status quo.

Question 17. How much time did you devote to the innovation?

Approximately half was spent on program management in general and half was devoted to the new idea throughout his tenure as PM.

2. Major General Snider's Responses to the Questionnaire

Question 1. Describe an innovation you made as a PM from "inception" to full implementation.

MG Snider described the redesign of the Comanche program. Two billion dollars were taken from the Comanche POM just prior to his assignment as PM. The program was placed in a hold status to preserve technology. He was given 3 months to restructure the program to "get back" the funding. The program cut moved IOC from 2003 to 2006. He stated, "A paper program is only worth the paper it is on". To win the money back, MG Snider, with his program team and contractor, proposed to field prototypes in 2001, earlier than originally planned before the funding cut. Having an actual flying aircraft would show appropriators the risk is reduced. He also stated, "Out year money is not as interesting as near year money, people are always willing to give you out-year money".

This innovation is interesting because OSD cut the program but Army still wanted it. The PM was faced with finding a tactful, political way of changing the Comanche program in the eyes of OSD to gain back the funding loss of two billion dollars. The PM had the support of the Army Chief of Staff and other Army acquisition executives, but not the Office of the Secretary of Defense.

He allowed "marketing" by the contractor with the prototype. Tom Clancy conducted a book signing in May (during Congressional budget marks) at the Capitol. Clancy was a supporter of the Comanche. The program received all of its initial funding and a \$100 million plus up in FY1996. MG Snider called it a "programmatic strategy innovation". Innovation was achieved in summer 1995 when program was put back into

full-scale status. Innovation took one year from start to full funding and \$100 million plus up.

Question 2. What were the pros and cons of the innovation?

MG Snider described the "pros" of the innovation as:

- (a) operational community gets aircraft sooner, testing sooner, and integration of computer package would be there earlier.
- (b) low-observability characteristics of aircraft achieved earlier.
- (c) program's technological risk is reduced.

The "cons" were described as:

- (a) high-risk strategy, puts more risk on contractor
- (b) contrary to OSD desires--going against the direction of higher.

Question 3. What were the attitudes of your seniors, peers and subordinates toward your innovation? How did they change over time?

Gen Sullivan, The Army Chief of Staff, saw the need for Comanche early on. He called the Comanche the "quarterback of the Army". He even came to the Tom Clancy book signing and the first Comanche roll out. Another senior, the Army's Acquisition Executive, Mr Decker, was supportive and even helped derive some of the program acquisition strategy. From his peer group there was not a great deal of support, but high interest. They all had the same boss, so they had to fall in line, they had their own programs to worry about. Peers had a neutral effect on program during the innovation. His subordinates realized it would take a huge team effort to achieve the innovation and supported him. The contractor was the most difficult to sell the innovation to since they

were taking on more risk with a faster schedule at a fixed cost, but they had to do something to guarantee their "meal ticket".

Question 4. Did you have a formal or informal plan to achieve this innovation? If so, describe. How did the plan changeover time?

MG Snider and his team had to show both the Army Chief of Staff and OSD that the program could shift "left" (move events up) and that the shift would lower the technical risk of the program. He felt the best way to get the money back was to get an actual flying prototype "in the hands" of the aviation community.

He did not adjust strategy when the aircraft didn't fly when first scheduled Nov. 30, 1995. Jan. 6, 1996 was actual first flight.

He encountered problems with the strategy from the user, who wanted more on the aircraft, resulting in more testing. It was a strong user group, that had their own ideas and wanted to be in charge. The user was thinking "now that program is approved again, here are the additional things we need". They wanted compromises, which added risk.

Question 5. Did you develop some sort of prototype for the innovation? (e.g., computer program, pilot program, model)

The innovation was about getting a prototype of the Comanche out sooner. He gave a briefing of the new timeline, using computer-aided drawings to show the changes to the program and how much earlier in the schedule the flying prototypes would be available. He stated there was no room in budget for prototypes of his idea.

Question 6. Who were the innovation's proponents?

He claimed as proponents the Vice Chairman of the Joint Chiefs of Staff (JCS) and the Army Chief of Staff, Gen Sullivan.

Question 7. How did you use the proponents to help you?

Chief of Staff of the Army set priorities for Army acquisition programs; put Comanche first. Unplanned help by a proponent occurred in the DAB at the milestone review. OSD concerns about production funding surfaced. OSD felt there were too many programs competing for resources during the same period. The JCS J-8, speaking for the Vice JCS Chairman, addressed OSD production concerns and changed the course of the meeting. In effect he over-rode the OSD "no" vote.

Question 8. Who were the innovation's opponents?

At the DAB, OSD production folks said the program wouldn't work, it required too much money to make it, the slip in schedule would cost, and there were too many competing priorities (F-22, MV-22). They voted no at the DAB.

Question 9. How did you handle opponents?

The opponents were dealt with by the proponents. Proponents supported the innovation (by supporting the program) without solicitation from PM.

Question 10. Did your innovation work as anticipated?

Yes.

Question 11. Were compromises a part of getting the innovation accepted?

Few compromises were made. The program conceded \$100 million in funding but received it back later.

Question 12. Where did the innovation originate? Was the innovation borrowed from another area or context?

Brainstorming. He had three months to re-brief to DAB. He had to make substantial changes. PM, deputy, tech chief, and log chief were included in brainstorming effort.

Question 13. Did you inherit any innovative ideas from the previous PM? If so were you able to achieve them? Why or why not?

Some, but difficult to enact due to program status. Some innovations that were contrary to the new direction of the program, based on his innovation, could not be implemented. Other smaller innovations (he described them as “internal” innovation) were attempted.

Question 14. Did you leave any unfinished innovation attempts to your successor?

No.

Question 15. Do you consider yourself creative? An entrepreneur?

He sometimes considers himself creative, but does not consider himself an entrepreneur. He brought new views to program, and could ask the hard questions. When a new PM comes in every 3-4 years, he can ask dumb questions, which stimulates new thought and innovations.

Question 16. What was the biggest barrier to achieving the innovation?

Competing interests and decisions on a consensus basis were listed as the biggest barriers to his innovation. You need big players on board to succeed but there are too many other programs and priorities to make success a given.

Question 17. How much time did you devote to the innovation?

He took a full month to create a strategy/plan for the innovation, and to talk to Army acquisition executives (over Christmas holiday). He focused on the details after base plan was set.

3. Brigadier General Feigley's Responses to the Questionnaire

Question 1. Describe an innovation you made as a PM from "inception" to full implementation.

BGen Feigley is credited with creating the first government-contractor collocated program office for a MDAP. The idea surfaced during the Concept Exploration phase, prior to the award of the phase I contract. Collocation of the management offices was actually stipulated in the RFP, so it would be a requirement for the winning offeror. The idea was also related to the IPPD concept. BGen Feigley believed collocation was needed to make the IPPD process work.

In his words, the jump from the current system (AAV) to the AAAV was similar to what happened in aviation--propeller to jet-like transformation. He also calls the AAAV "a track laying aircraft".

The idea was to create an industry-Government partnership to share Government knowledge of an AAAV-like system. He described a "sociological perspective" achieved through collocation to share information. What was needed was more than just a sharing of data and reports. BGen Feigley knew he had to try something different to get the results that he wanted. He started from the premise that to be successful the Government

and contractor teams would have to share much of the same information and develop the same "social perspective". The best way to do this was collocation.

Question 2. What were the pros and cons of the innovation?

The "pros" were articulated as:

- (a) creation of a "sociological perspective" for the contractor
- (b) better developed professional trust and confidence between the two teams
- (c) more effective IPPD
- (d) speed--decreased turnaround time

The "cons" of the innovation were articulated as:

- (a) legal issues, maintaining "arms-length integrity"
- (b) harder to keep some information separate (certain information that was required to be separate)s
- (c) speed--hard to maintain proper control with decreased turnaround time

Question 3. What were the attitudes of your seniors, peers and subordinates toward your innovation? How did they change over time?

He didn't ask for his superiors' permission. Originally his seniors were surprised. He responded, "How is my idea contrary to what you want?" He showed them how his idea was in line with acquisition reform and policy goals. He convinced superiors that the idea would work. As the idea proved successful, seniors' support became more vocal.

Because BGen Feigley was a Direct Reporting Program Manager, his peers were not an issue with the idea. His contractor counter-part would have to support the idea because it was in the RFP.

Originally, subordinates were worried. BGen Feigley devoted time to explain “why” and educate the PM office, changing the worried attitude to one of understanding and support. Then he asked for their help in forming a strategy to address how they would make collocation work.

Question 4. Did you have a formal or informal plan to achieve this innovation? If so, describe. How did the plan changeover time?

His strategy focused on "how" to get the idea accepted, not "if" the idea is accepted. He conducted experimenting within his mind to test the theories of the innovation. It was critical for the government to transfer all it knew about amphibious vehicles to the contractor.

He stated, "part of innovation is having a great deal of autonomy." His decision to collocate the program office was made unilaterally. He made the decision, then after the contract was awarded he notified his seniors of his innovation. Sort of a “seek forgiveness” rather than “ask permission” strategy.

Part of his strategy to accomplish the innovation included study of the past. He emphasized the importance of knowing history to avoid past pitfalls (studied Polaris and Posidon programs) and to establish baselines. To avoid falling in the “same old rut”, he advises looking at other commodity lines (e.g., tanks, airplanes submarines, etc.).

He developed a theoretical plan for collocation in the RFP, but realized the plan needed continuous leadership effort.

BGen Feigley discussed strategy for what he called the theoretical part of the idea, and strategy for implementing the idea. Strategy for actual implementing included convincing proponents that the ethical issues could be resolved and changing the cultural views of the subordinates in the PM office.

He expressed his belief that there is no cookbook for innovation; you can't follow a set of rules or steps with an idea and get innovation on the other end.

Question 5. Did you develop some sort of prototype for the innovation? (e.g., computer program, pilot program, model)

No, it was all or nothing.

Question 6. Who were the innovation's proponents?

BGen Feigley believed that in theory he had both the pentagon and OSD (AT&L) on his side. Both were professing the need to reform acquisitions, he felt they would support his idea. He gained proponents as time passed.

Question 7. How did you use proponents to help you?

Proponents were watching the idea; they wanted to see how it would work to achieve acquisition reform goals.

Question 8. Who were the innovation's opponents?

The legal and comptroller functional areas associated with his program were opposed to the idea. Acquisition "watch dog" groups were also concerned.

Question 9. How did you handle opponents?

He had an open door policy at the facility. He invited opponents to come and see for themselves that nothing improper was taking place. "See anything you want, attend any meeting you want. And, if you do find anything, thank you, we'll fix it."

He understood that even the best ideas meet opposition. He wanted to lead the opposition into believing that his idea would work.

Question 10. Did the innovation work as anticipated?

Yes and no. Programs are not linear. Phases and stages of activities occur within programs. IPPD process had to weather adversity to test the strength of the innovation. For the most part the IPPD concept survived during critical moments within the program. Younger program personnel were more accepting of the collocation and IPPD process than the older personnel were.

Question 11. Were compromises a part of getting the innovation accepted?

BGen Feigley said he did not compromise on the "if" it would happen, but he did on the "how" it would happen. He included the program team in the "how" decisions. He used his team to build the strategy to implement the idea.

BGen Feigley believes the 2 biggest reasons innovations fail are lack of integrated approach and lack of concern for people affected by the innovation.

Question 12. Where did the innovation originate? Was the innovation borrowed from another area or context?

BGen Feigley conceived the idea as a part of the acquisition strategy for the program going into the PDRR phase. He studied acquisition history to determine what worked best in past successful programs.

Question 13. Did you inherit any innovative ideas from the previous PM? If so were you able to achieve them? Why or why not?

N/A, technically there is no PM during Concept Exploration.

Question 14. Did you leave any unfinished innovation attempts to your

Yes, lots. In the areas of logistical design engineering.

Question 15. Do you consider yourself creative? An entrepreneur?

Doesn't really consider himself creative. It just appears that way. Thinks logically in a systematic way. He considers himself an entrepreneur, described it as part of his style. "I am always looking for something better."

He also said, "You can't under-estimate the value of persistence in innovation." He placed more importance on persistence

Question 16. What was the biggest barrier to achieving the innovation?

He described the uncertainty of the idea; he couldn't prototype it, so it can only go from your mind to actually doing it. He doesn't consider this a barrier; rather, he sees it as a burden. Due to nature of DRPM, he did not experience any bureaucratic barriers.

He did list inertia of the status quo and initial cultural barriers to Govt/contractor daily integration, in the first months, as barriers.

Question 17. How much time did you devote to the innovation?

He said that as a PM he is constantly thinking about improvements to his program. When pressed to describe it quantitatively he estimated that 5-10% of his time as PM is spent on the execution of the innovation. While people on AAAV team were focused on implementing the collocation idea, he was already thinking about the next idea that would improve his program.

4. Rear Admiral Johnston's Responses to the Questionnaire

Question 1. Describe an innovation you made as a PM from "inception" to full implementation.

RDML Johnston's idea was to include in the JSOW contract a warranty for every JSOW unit purchased by the Navy. The original estimates for the warranty were approximately 6% of the unit cost. His innovation garnered a warranty for 1.5% of the unit cost.

His idea required a shift in the maintenance responsibility from the Navy to the contractor. The contractor would become more concerned about the actual reliability of the system, since they would bear the added cost of maintenance if the actual reliability is less than they advertised.

His idea would make the manufacturer responsible for the performance of the weapons system for the life of the system. The contractor would be responsible not only to identify and correct latent defects ten or twenty years into the lifecycle, but also to retrofit the existing inventory with the reliability upgrade.

Both parties estimated 2 major redesign retrofits in the missile's life. Contractor was not originally convinced that they could provide the warranty for the price the government was willing to pay (1.5%). The PM shop proposed a cap to reduce the contractor's liability in the event the missile experienced unforeseen catastrophic problems that would cause the contractor to go bankrupt. The cap was set at \$50 million.

The idea was to drive design behavior of the contractor to produce a missile with higher reliability. He showed how the warranty would be cost effective (pay for itself) within a few years. He used warranty money (1.5% of the unit cost) to influence the contractor behavior and save money in the future, through production of a higher quality weapon system.

Question 2. What were the pros and cons of the innovation?

The "pros" of the innovation were identified as:

- (a) incentivize the contractor to manage the system's life-cycle configuration
- (b) better product, with better long-term reliability
- (c) shrink Government systems engineering staff in the future.

The "cons" were identified as:

- (a) higher cost (but pays for itself in the long run)
- (b) cap on warranty liability (\$50 million) meant that the Government assumed the risk of exceeding the cap.

Question 3. What were the attitudes of your seniors, peers and subordinates toward your innovation? How did they change over time?

RADM Cook, his Program Executive Officer (PEO), gave his full support, liked the new idea, and empowered RDML Johnston. DAB and pre-DAB committees understood the complexities of the innovation. Generally, his peers were supportive, but apprehensive in the beginning because of competition for scarce funding dollars. They vocalized issues of concern to PM. His contractor peers didn't want to "bet the farm" on the idea. Through consensus, the idea gained support. His subordinates were supportive of the idea, and believed it was the "right thing to do".

Question 4. Did you have a formal or informal plan to achieve this innovation? If so, describe. How did the plan changeover time?

RDML Johnston described several aspects of what he described as an informal strategy:

- (a) an early "socialization" of the idea. In other words, the idea was discussed openly with those involved to test the reaction to it and to get people thinking about it.
- (b) need for subordinates support of the idea was paramount. Used a strategy of communication to get subordinates on board.

The only formal part of the plan included developing a briefing schedule to convince those in DoD with the power to stop the idea that the idea was the right thing to do for the JSOW.

He offered that the following are general strategies for any innovation:

- (a) avoid adversarial relationships
- (b) communicate often, discussion is good
- (c) develop a good network
- (d) treat every question as an opportunity to improve your idea

RDML Johnston stated that the warranty innovation was a natural evolution of the right thing to do in the program, it was not a flash of brilliance.

Question 5. Did you develop some sort of prototype for the innovation? (e.g., computer program, pilot program, model)

To demonstrate proof of the concept and help predict contractor costs (reduce risk), a computer simulation model for maintenance costs was developed. Monte Carlo simulation techniques were employed for both re-design and retro-fit maintenance programs. 75-80% confidence intervals were chosen. These prototype models were used to predict the cost effectiveness of the idea for both the contractor and Government sides.

Question 6. Who were the innovation's proponents?

In the early stages of the innovation RDML Johnston described the role of his program office not as proponents but as investigators. Once they were convinced of its merits they became proponents. RADM Cook, his PEO, was an early proponent. Proponents within the Navy acquisition structure were won over and became supportive as the idea evolved.

Question 7. How did you use proponents to help you?

RDML Johnston, as the PM, "armed" his PEO, RADM Cook, with 4-5 "sound bytes" (key benefits of the warranty that addressed concerns/issues of the opposition).

He used proponents in a continual effort to grow support for the idea. He couldn't get the idea approved at one sit-down meeting. He needed to "spread the idea like a virus".

Question 8. Who were the innovation's opponents?

OSD didn't believe the warranty was value added. OSD believed the Government is its own best insurer. The contractor was reluctant to sign up to the innovation because they didn't have a good grasp of how much risk they assumed for the warranty payment. Within the company the engineering function was at odds with the management function over the true nature of the risk.

Question 9. How did you handle opponents?

He described his approach to opponents as "straight up". He didn't go around them or through them, but used their criticisms to make his idea better. Addressing their concerns won them over and made the idea better, making it easier to win others over.

Question 10. Did the innovation work as anticipated?

RDML Johnston believes the idea worked like it should, but acknowledged that, because the idea deals primarily with long term reliability of the JSOW weapon system, it is too early to tell. He stated, "the weapon has been dropped 65 times in combat and 65 times it has gone where it was supposed to go".

Question 11. Were compromises a part of getting the innovation accepted?

Yes. He had to modify the idea to include cost caps for the contractor to reduce risk and get contractor to approve. The contractor had to approve the innovation through a change to the existing contract.

To get DoD approval, he had to downsize Government system engineering support for the JSOW in the out years and show how doing so factored into the total cost of the system.

Question 12. Where did the innovation originate? Was the innovation borrowed from another area or context?

Those in the PM shop had always believed that a new weapon ought to have a warranty, just like a new car. The idea was floated around the PM shop; it may have been from a previous PM.

Question 13. Did you inherit any innovative ideas from the previous PM? If so were you able to achieve them? Why or why not?

The origins for the warranty were inherited through the program office personnel. RDML Johnston stated he believed innovation was "about 70% dependent upon the individual and 30% on the idea". He has seen very few bad ideas but a lot of bad implementation.

Question 14. Did you leave any unfinished innovation attempts to your successor?

No, don't recall any.

He believes most ideas begin 1-2 years after a PM comes into the program. Takes about a year to get your feet on the ground and you're excited about it (the program).

You see something that you want to achieve during your time and you work to achieve, toward the end you are looking to tie up all the loose ends.

Question 15. Do you consider yourself creative? An entrepreneur?

Yes to both. Considers himself creative, enjoys it. Enjoys translating, selling, and discussing.

Question 16. What was the biggest barrier to achieving the innovation?

The biggest barriers to his innovation were technical barriers relating to the actual idea (shifting liability to the contractor) and too many people have the power to say "no". The latter complicates the communications aspect.

Question 17. How much time did you devote to the innovation?

For approximately 6 months of his time as PM the idea consumed about 10% of his and his team's effort.

5. Colonel Matthews' Responses to the Questionnaire

Question 1. Describe an innovation you made as a PM from "inception" to full implementation.

COL Matthews described a "blanket travel orders" innovation to improve the travel orders process within his program. Travel orders were a significant administrative burden; 10-20 people in his program were always on travel (100 people in the program office). Due to the nature of his program, short notice travel happened frequently, exacerbating the already cumbersome process. The current administrative process was complex, time consuming, counter-productive. He learned about a Total Quality Management (TQM) travel initiative, through an R&D magazine, called "blanket travel".

The agency invented it by putting GS-13 and above personnel on travel orders for one full FY. Travel was authorized only in the 48 contiguous states. Orders were kept on file at SATO office.

After he implemented blanket travel orders the administration process for travel orders was reduced from a full day to several minutes. To get his idea approved, COL Matthews had to show there were reasonable mechanisms in place to detect/prevent fraud waste and abuse. He received approval for GS-14's and above for a three-month period as a pilot program, then won approval for GS-13's. Later, he unilaterally lowered it to GS-11's with history of frequent travel. He did not seek permission from his superiors as he was the highest reviewer for those travel orders. In his words, "forgiveness was easier to obtain than permission".

Question 2. What were the pros and cons of the innovation?

He listed the innovation's "pros as:

- (a) efficiency
- (b) improved employee morale

The "cons" were listed as:

- (a) potential for abuse
- (b) hard for comptrollers to keep track of obligations

Question 3. What were the attitudes of your seniors, peers and subordinates toward your innovation? How did they change over time?

His seniors were originally opposed to idea, thought it was incompatible with being a steward of Government funds. They had to be convinced that fraud could be

detected. His peers included the Deputy PEO, a COL, who was against the idea at first due to fraud concerns. COL Matthews stated that the deputy PEO was sort of peer and superior. Other PM's were happy to see the system changed, and realized they would reap the benefits of the innovation. His subordinates, both the travelers and secretaries in his program, were thrilled. They were supportive of the idea because it reduced workload and hassle for them.

Question 4. Did you have a formal or informal plan to achieve this innovation? If so, describe. How did the plan changeover time?

COL Matthews' plan focused on "how do we overcome bureaucratic opposition to an idea" that was "too smart", it made too much sense. He knew there would be opposition from comptrollers and superiors concerned about fraud. He knew that the relaxing of the existing inefficient travel procedures would take some selling. After communicating the idea to concerned parties, he modified his strategy to address their critiques. He had to create an acceptable notification system for the comptrollers. As it turned out, email was the best way to notify "bean counters" with estimates. Email was also chosen as the means to notify concerned parties of non-routine travel justifications. He stated that he had separate strategies to deal with superiors and functional area parts of the organization, e.g., legal and comptroller. To convince his superiors that the idea would work, he had to walk the new system through the fraud oversight mechanism, after the first trip, to demonstrate that committing fraud under the new system was not easier than the old system.

COL Matthews did not originally plan for a pilot program. It was a compromise, a change in strategy. COL Matthews wanted to go straight into the new procedures. When he sold the senior leadership that it was a good idea he couldn't convince them the oversight would be adequate without the pilot program. The idea would be re-evaluate with empirical data. COL Matthews sampled travel vouchers after the pilot program and determined that fraud could only happen with elaborate and complex schemes that could not be detected under the old system any way. This convinced his seniors that the new idea was as good as old way at detecting fraud, but was much more efficient and improved employee morale regarding travel.

Question 5. Did you develop some sort of prototype for the innovation? (e.g., computer program, pilot program, model)

The prototype was a pilot program. It was a plan to allow GS-14s and above to use blanket travel for three months, to test the concept. It was not part of the original strategy. It was an ad hoc change to the strategy that ultimately resulted in the success of the innovation.

Question 6. Who were the idea's proponents?

Originally, just himself and his program staff. Then he convinced the Deputy PEO to allow a pilot program.

Question 7. How did you use proponents to help you?

Once he convinced the Deputy PEO and PEO, the other functional areas of the organization had to implement the innovation.

Question 8. Who were the innovation's opponents?

As described above, his PEO and Deputy PEO were originally against the idea. The comptroller office was an opponent because they lost some control and still had responsibilities to show obligations and expenditures. They're chief complaint about the idea was "how would we still have a handle on the dollars?"

Question 9. How did you handle opponents?

COL Matthews planned in the strategy to win over his PEO with the merits of the idea so other opposition (comptrollers) would be directed to comply with the new process. He wanted to shift the gravity in their favor.

Question 10. Did the innovation work as anticipated?

Yes

Question 11. Were compromises a part of getting the innovation accepted?

Yes, the pilot program was compromise. It delayed implementation but increased odds of favorable implementation. He also had to devise a way to notify the comptroller office of estimated and actual travel expenditures so they could track his program's spending.

Question 12. Where did the innovation originate? Was the innovation borrowed from another area or context?

He learned of the idea from an article in a Government R & D magazine--he doesn't recall which one. The article described a TQL initiative that was successful in another acquisition organization, he thinks it was a space and missile defense program. After he read about it he realized blanket travel could solve a lot of his travel

administration problems. He didn't think that it would be hard to implement the idea because there was already a precedent.

Question 13. Did you inherit any innovative ideas from the previous PM? If so were you able to achieve them? Why or why not?

No, none.

Question 14. Did you leave any unfinished innovation attempts to your successor?

Yes, an idea about the accuracy of missile (medium range error was greater than at max range). The program office established a working group to find a solution. They found an incorrect range/bomb dispersal algorithm at medium range.

Question 15. Do you consider yourself creative? An entrepreneur?

He considers himself more creative than the average PM, but not at top of list. He considers himself an entrepreneur. He stated, "I'm a pretty good salesman" and "I'm flexible and a good communicator. I don't give 'how', I just give 'what'."

Question 16. What was the biggest barrier to achieving the innovation?

The biggest barriers he encountered were bureaucratic inertia and people are risk adverse, they are comfortable with the status quo.

Question 17. How much time did you devote to the innovation?

He devoted a couple of hours in a couple of weeks to implementing the idea.

E. CHAPTER SUMMARY

Five former MDAP PMs described their experiences managing innovation within their programs. The PMs represented programs from the Army, Navy and Marine Corps in the areas of aviation, missiles and air defense, and amphibious vehicles. Each former

PM discussed characteristics of a single innovation they achieved or helped achieve. Their responses focused on the innovation, persons involved with the innovation, strategies, and barriers to achieving the innovation.

V. ANALYSIS

A. INTRODUCTION

This chapter summarizes the analysis of the data contained in the interview responses of the five PMs. First, the classification scheme used to order the data is discussed and justification for the categories and classifications is provided. Points of convergence and divergence in the data are then discussed and analyzed. This systematic analysis provides the basis for the identification of themes in managing innovation in acquisition programs.

B. CLASSIFYING INTERVIEW DATA

Analysis of the interview responses will be conducted according to a classification scheme as an aid to both the research and the reader. I attempted to organize the interview responses in relation to the secondary research questions of this thesis. In general, the secondary research questions pertain to four categories: (1) the public entrepreneur, (2) the idea/innovation, (3) strategies, and (4) barriers. Therefore, I have chosen to classify the interview responses in those four categories.

1. Public Entrepreneur

The public entrepreneur category of the classification scheme contains of information specific to the entrepreneur(s) associated with the idea/innovation. The category includes:

- (a) Group or individual. If other peers or superiors helped implement the idea, it is considered group entrepreneurship. If the PM alone championed the innovative idea, it is considered individual entrepreneurship.

- (b) Creative/Entrepreneur. The PM's self report regarding creativity and entrepreneurship. PMs directly answered this question in the interview.
- (c) Time spent on idea. The amount of time he devoted to implementing the idea. This is expressed in terms of hours per week or percentage of time while implementing the idea.
- (d) Idea vs. Entrepreneur. The importance of the new idea vs. the entrepreneur. This is a determination whether the PM believes the merit of the innovative idea is more important in achieving innovation or the entrepreneur.
- (e) Inherited/left ideas. PM stated whether he inherited ideas from the previous PM or left any ideas to his successor.
- (f) How long a PM. Estimate of how long the PM was in the program before he attempted the innovation.

Figure 6 depicts the public entrepreneur category classification.

Category	PM Response
1. Public Entrepreneur	
a. <i>Group or individual</i>	Group or individual
b. <i>Creative/Entrepreneur</i>	(yes or no) / (yes or no)
c. <i>Time spent on idea</i>	Time stated as a percentage or actual time
d. <i>Significance of idea vs. entrepreneur</i>	Idea or individual(s)
e. <i>Inherited/ left ideas</i>	(yes or no) / (yes or no)
f. <i>How long in job</i>	Start, mid or end

Figure 6. Public Entrepreneur Category

2. Innovation

The idea/innovation category contains typology associated with the definition of innovation used in this thesis, "successful introduction into an applied situation of a means or ends that are new to that situation" (Mohr, 1969, p112). From the definition, innovations can be classified as a new "means" or an "ends". New "means" equates to process innovation, while new "ends" equates to product innovation. An innovation can be both a product and a process. An idea that is "new to the situation" includes origins that can be classified as borrowed, modified or new (Roberts and King, 1996). A borrowed idea is one that is taken from another situation and used unchanged in a new situation. A modified idea is also taken from another situation, but it is tailored or changed to meet the conditions of the new situation.

Also, in the idea/innovation category are details including: the acquisition phase in the program when the innovation occurred, and whether the idea originated internal or external to the program office. An idea will be classified as internal if its originator(s) belonged to the program office at the idea's inception, or external if not associated with the program at the idea's inception. Figure 7 depicts the idea/innovation category classification.

Category	PM Response
2. Innovation	
<i>a. Product or Process</i>	Product, process or both
<i>b. Origination</i>	Borrowed, modified or new
<i>c. Originator(s)</i>	Internal or external to the program
<i>d. Phase in program</i>	CE, PDRR, EMD, PF/D&OS
<i>e. Compromises</i>	Yes or no

Figure 7. Innovation Category

3. Barriers

This category of the classification scheme lists the barriers encountered by the PM while trying to achieve innovation. Figure 8 depicts the barrier(s) category classification.

Category	PM Response
4. Barriers	
<i>a. Types of barriers</i>	List of barriers

Figure 8. Barrier Category

4. Strategy

The strategy category of the classification scheme relates PM responses to these sub-categories:

- (a) Description of strategy. Here I provide a short title of the strategy or strategies employed by the PM to implement the idea.
- (b) Formal or informal. Classification of the strategy as formal or informal. Formal strategy equates to a planned and systematic innovation attempt (Roberts, 1999), while informal equates to innovation through "groping along" (Behn, 1988; Golden, 1990).
- (c) Changes to strategy. Indicates whether the PM made any changes to his strategy as the idea evolved.
- (d) Compromises. This section identifies whether the PM had to compromise on his idea to achieve innovation.
- (e) Use of prototype. Yes/no indication whether the PM used a prototype of the idea as part of his innovation strategy.

(f) Barrier(s) influence strategy. Yes/no indication as to whether or not the PM formed a strategy with innovation barrier(s) in mind.

Figure 9 depicts the strategy category classification.

Category	PM Response
3. Strategy	
<i>a. Description of strategy</i>	Short title of strategy or strategies employed by PM
<i>b. Formal or informal</i>	Formal or informal
<i>c. Changes to Strategy</i>	Yes or no
<i>d. Use of prototype</i>	Yes or no
<i>e. Barrier(s) influence strategy</i>	Yes or no

Figure 9. Strategy Category

C. CLASSIFICATION SUMMARY

The responses from each interview subject were classified according to the scheme described above. In two instances a subject's response to a particular question was implicit or unclear. In these instances an assumption was made that best represented the answer. Assumptions are annotated within the table and described in the notes at the bottom of the table. A categorized summary of the interview subjects' responses is provided in a single table for comparison (Figure 10).

Category	VADM Dyer	MG Snider	BGen Feigley	RDML Johnston	COL Matthews
1. Public Entrepreneur					
a. Collective or individual	Collective	Collective	Individual	Individual	Individual
b. Creative/ Entrepreneur	Yes ¹ /Yes	Yes/No	No/Yes	Yes/Yes	Yes/Yes
c. Time spent on idea	50% throughout	1 full month initially, then occasionally	5-10% throughout	10% for 6 months	Couple of hours per week for several weeks
d. Significance of idea vs. entrepreneur	Entrepreneur	Entrepreneur ²	Entrepreneur	Entrepreneur	Entrepreneur ³
e. Inherited/ left ideas	No/Yes	Yes/No	No/Yes	Yes/No	No/Yes
f. How long a PM	Start	Start	Start	Start-mid	Mid
2. Idea/Innovation					
a. Product or Process	Process	Process	Process	Process	Process
b. Origination	Modified	Modified	Modified	Modified	Borrowed
c. Originator(s)	Group	Group	Individual	Group	Individual
d. Origin relative to program	External	Internal	Internal	Internal	Internal
e. Phase in program	EMD ⁴	Late PDRR	CE/PDRR	EMD	PF/DO&S
f. Compromises	Yes	No	Yes	Yes	Yes
3. Barriers					
a. Types of barriers	-Shift of power -Inertia of status quo	-Competing interests -Consensus based decisions	-Uncertainty of idea -Inertia of status quo -Different Govt. & contractor culture	-Technical (relating to idea) -Too many people can say no.	-Bureaucratic inertia -People are risk adverse -Wasn't invented here
4. Strategy					
a. Description of strategy	-Communicate new idea internally -Hand pick leaders -Use of proponents	-Earlier aircraft -Reduce risk -"Marketing" ⁵	-Focus on "how" not "if" -Communicate idea internally and externally -Seek "forgiveness" rather than "permission"	-Early "socialization" of idea -Communicate idea internally -Use criticism to improve idea	-Overcome bureaucratic opposition -Demonstrate efficiencies of new idea -Seek "forgiveness" rather than "permission"
b. Formal or informal	Formal	Formal	Informal	Informal	Informal
c. Changes to Strategy	Yes	No	Yes	No	Yes
d. Use of prototype	Yes ⁶	No	No	Yes	Yes
e. Barrier(s) influence strategy	Yes	Yes	Yes	Yes	Yes

Figure 10. Categorized Summary of Interview Subjects' Responses

Notes:

1. Stated he is "an integrator, if that is creative then, yes".
2. An assumption; stated a new PM is in a good position to champion ideas. Implies dormant ideas in the program need a new PM to become innovation.
3. An assumption, described bureaucratic opposition to an idea that "made too much sense". Implies something more than a good idea is needed.
4. F/A-18 E/F started in EMD phase as an upgrade to current F/A -18 A-D models.
5. Allowed contractor to "sell" the idea to Congress and would-be supporters.
6. The F/A-18 E/F program was the prototype for NAVAIR.

Figure 10. Categorized Summary of Interview Subjects' Responses cont.

D. POINTS OF CONVERGENCE

Comparing the responses in Figure 10 yields interesting similarities, or points of convergence. The similarities are addressed first by category, then across categories.

1. Public Entrepreneur

All interviewees saw themselves as either creative or an entrepreneur, or both. They all agreed explicitly or implicitly that the entrepreneur (individual) is the key ingredient in achieving innovation.

2. Innovation

Interestingly, not one PM described an innovation involving a new "end" or product. All five innovations are considered process innovations, since they resulted in a new "means". This is probably due to the fact that DoD PMs are responsible for navigating their program through the acquisition process, while the contractor is responsible for the actual design of the weapon system. I would expect to see the contractor PM achieve product innovations vice process innovations. All but one innovation originated from within the program itself. Four innovations were modified; the remaining innovation was borrowed.

3. Barriers

Barrier themes expressed by the subjects included: inertia of status quo, the difficulty of achieving innovation when too many people in the approval process can say "no", and uncertainty or risk. Every PM identified multiple barriers to achieving their innovation.

4. Strategies

All the interview subjects devised strategies with multiple components. Communicating the merits of the innovation was a key component in three of the subject's innovation strategy. If you consider "marketing" or selling as a communication strategy, four PMs included the communication component in their strategies. Four PMs made compromises to their original idea to successfully implement it. All PMs articulated a linkage between their strategy and their barriers. Additionally, all PMs interviewed assessed both the innovation's pros and cons and key players who were for and against the innovation, before they formulated their strategy.

5. Intra-category

Three of the four innovations that originated within the program had individual entrepreneurs. Both group entrepreneur efforts began as innovative ideas originated by groups.

Two PMs (VADM Dyer and BGen Feigley) began working on their ideas before they were assigned as PM, the third, MG Snider, began working on his idea from the first day as PM. The PM who began his innovation attempt near the middle of his tenure used a borrowed innovation.

PMs had difficulty articulating whether their strategy was strictly formal or informal. One of the factors I used to determine formal or informal strategy was the PM's estimate of time spent on achieving the innovation. Considerable amounts of time are needed to formulate strategy, assess the strategy's effectiveness and to make adjustments based on the assessment.

6. Literature

Data from the subjects' interview responses generally indicate that current public entrepreneur and innovation literature accurately describes and predicts that PMs use collective and individual forms of entrepreneurship to achieve their innovation and that PMs use informal strategies ("groping along") to achieve innovation. Additionally, through interviewees' descriptions of their innovation from start to finish, innovation phases described in the literature were validated.

E. POINTS OF DIVERGENCE

Comparing the responses in Figure 10 also yields interesting points of divergence or differences. These differences are addressed first by category, then across categories.

1. Public Entrepreneur

Both group and individual entrepreneurship models were demonstrated. Time spent on the idea varied dramatically from 50% throughout the PM's assignment, to a couple of hours for a few weeks. Time spent on the innovation is a likely indicator of the magnitude or scale of innovation attempted and should be used as a measure of the degree of innovation in further studies. VADM Dyer, MG Snider and BGen Feigley

reported significant investments in time to achieve their innovations. I feel this is due to the magnitude of change they introduced in the acquisition environment.

PMs who didn't receive ideas from their predecessor passed on innovative ideas to their successors, but PMs who received innovative ideas from their predecessor did not leave ideas to their successors. This seems counter-intuitive. Wouldn't a PM who inherited innovative ideas be more likely to repeat this behavior if it proved successful? Why would PMs who didn't inherit innovative ideas pass ones on to their successors? I believe sharing innovative ideas has more to do with the personalities of the out-going and in-coming PMs and the special circumstances of a program. In only one case, the missile warranty innovation, did an innovative idea get passed from a PM to his successor and achieved--and this innovative idea transferred to the new PM via the program personnel, not PM to PM.

2. Innovation

Origins of innovative ideas were attributed to both individuals and groups. VADM Dyer's Competency Aligned Organization innovation was the only one that originated external to the program. Innovations occurred in programs throughout all phases of the acquisition process (CE through PF/DO&S)

3. Barriers

BGen Feigley focused on barriers to his innovation from within his program. The other four PMs were concerned with innovation barriers that were external to their programs. This may be due, in part, to AAAV program's status as a direct reporting program.

4. Strategies

Differing views on strategy and compromise were expressed. Only one PM, MG Snider, did not make any compromises to his original idea and did not make any changes to his innovation strategy. He believed that compromises would introduce more risk. Only one other PM, RDML Johnston, did not make any strategy changes because his strategy allowed for compromise in using opponents' criticism to improve the idea.

PMs employed formal and informal strategies. At one extreme a complex, uncompromising strategy to redesign a program was articulated and at the other extreme a PM described a flexible strategy that would react to and incorporate opponents criticisms during the innovation's implementing phase.

5. Intra-category

The two group entrepreneurial innovations, VADM Dyer's Competency Aligned Organization and MG Snider's Comanche program redesign, used different strategies concerning opponents. VADM Dyer's strategy included solicitation of his proponents to influence the innovation's opponents. MG Snider's strategy didn't include soliciting proponents, yet his proponents were instrumental in accomplishing the innovation.

It is apparent that there are relative differences in the magnitude of the innovations described by the five PMs. It is interesting to note the relationship between the magnitude of the innovation and the type of strategy used. I created an innovation and strategy comparison (Figure 11) to illustrate each innovation's relative magnitude and the type of strategy (formal or informal) used by the PM.

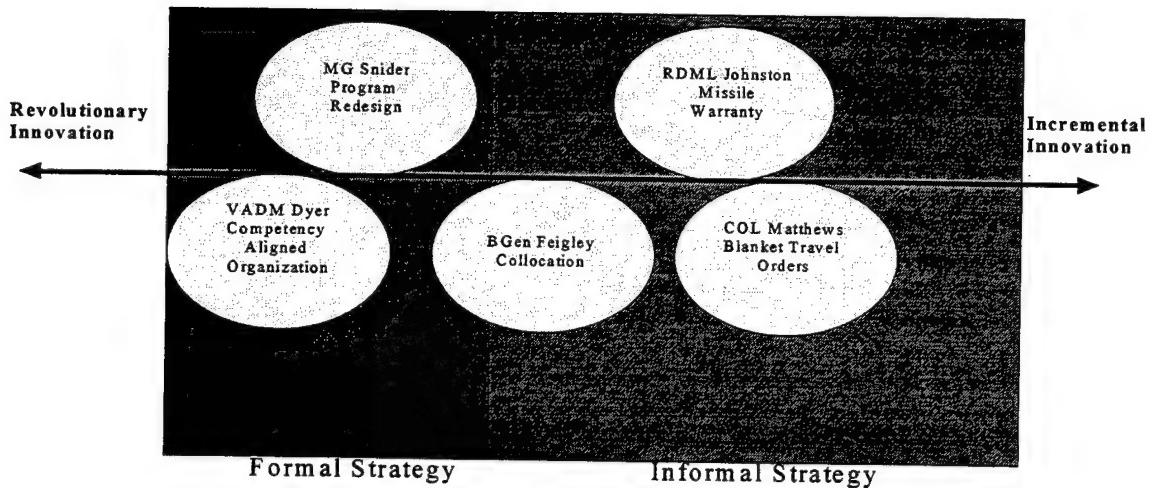


Figure 11. Innovation and Strategy Comparison

6. Literature

PMs were successful in achieving innovation through formal and informal strategies and their innovations were both incremental and revolutionary. This suggests that the "groping along" and "systematic analysis" methods of navigating the innovation process are both effective in acquisition programs. Judging from these five PMs and their innovations, it seems that the formal or analytical strategy is associated with a more revolutionary innovation while the less formal "tinkering" or "groping along" strategy was associated with a more incremental innovation. From a PM's perspective this makes sense. A PM thinks about "returns on investment". Therefore it would not make sense for a PM to spend time developing a formal strategy for an innovation that will only

produce incremental change, yet he would be willing to invest in a formal strategy that promises to pay off with revolutionary change.

F. CHAPTER SUMMARY

Analysis of the data, provided by interviews of PMs who successfully managed innovation in their respective programs, yields interesting results. Innovative ideas were originated and propelled through the innovation process via individual and collective entrepreneurial efforts. Most PMs consider themselves entrepreneurs. All the innovations described by the interview subjects were process innovations and most originated from within the program. Innovations occurred in all phases of the acquisition process and ranged from revolutionary to incremental in their magnitude. For the most part, subjects' responses to the interview questions support current public entrepreneurship and innovation theory. However, two PMs demonstrated formal or analytical modes of entrepreneurship that arguably resulted in more revolutionary innovations. This is contrary to the prediction in the literature that managerial entrepreneurs use informal strategy ("groping along") and only produce incremental change.

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VI. CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION

We are proceeding into the future with astonishing velocity, so we have to continue tearing down archaic barriers and burdens, and harness the full potential of private industry, and to continue to answer enduring challenges with novel solutions. That's really the spirit defense acquisition reform. (Cohen, 1999)

DoD continues to search for ways to improve the acquisition process. The primary goals of DoD's Acquisition Reform initiative are to reduce program cycle-time and cost. Many current practices, processes, and policies are not capable of achieving this goal; change is required. What Secretary Cohen calls "novel solutions" in his description of Acquisition Reform is a special kind of change--innovation.

Central to accomplishing Acquisition Reform goals is the PM. PMs are encouraged in the DoD 5000.1 to be innovative with respect to program cost and schedule. Little is contained in the DoD 5000 Series or any other acquisition manuals to assist the PM in understanding or achieving innovation.

In an effort to create a body of knowledge useful to PMs who wish to innovate, five PMs who successfully managed innovation in their respective programs were chosen as subjects for this exploratory study. A questionnaire was administered to each PM in an interview. Interview responses were then analyzed and compared to determine if general themes or heuristics regarding innovation in acquisition programs can be developed. This chapter will summarize the study's findings based on the original research questions.

B. RESTATEMENT OF THE RESEARCH QUESTIONS

The primary research question of this thesis is: **How do program managers (PMs) successfully manage innovation in defense acquisition programs?**

Secondary research questions include:

1. Who innovates in major defense acquisition programs?

PMs successfully innovated using collective and individual entrepreneurial modes. PMs were successful in achieving innovation in situations with PEOs as proponents and opponents. Most innovations originated from within the program office using group idea generation methods such as brainstorming.

2. What kinds of innovations occur in defense acquisition programs?

All five innovations in the study were process innovations. They dealt with a new "means" rather than new "ends" or product. Process innovation is to be expected from Government or DoD PMs since they are tasked with managing the program through the acquisition process, while the contractor-side of the program is responsible for the design, development, and manufacturing of the product or "ends". What remains to be validated is whether or not product innovations are more frequently achieved by contractor PMs.

3. What are the barriers to innovation in defense acquisition programs?

Common barriers to innovation were expressed by the five PMs in this study. Inertia of the status quo, human tendencies to be risk-adverse, and the difficulty in

achieving consensus for decision-making were barriers described by most of the PMs in this thesis.

4. Do PMs use strategies to innovate? If so, what strategies do they use? What are the relationships between their strategies, innovations and environments?

PMs in this study used strategies to achieve their innovations. PMs articulated both formal and informal strategies to achieving innovation, suggesting the "systematic analysis" method and the "groping along" method are both effective. All PMs described a strategy formulation process that, to varying degrees, took into account the pros and cons of the innovation, its proponents and opponents, and the barriers to achieving their innovation.

C. CONCLUSIONS AND RECOMMENDATIONS

"Best Practices" (Heuristics)

1. When formulating innovation strategies, effective PMs assess environmental conditions such as barriers, proponents and opponents. Their strategies are then developed to make use of proponents, win over opponents, and navigate through or remove the barriers to achieving innovation.
2. PMs who are new to a program are in the best position to innovate. Look within the program for "dormant" innovations.
3. Effective innovation strategies usually include a component for communicating the innovation to persons within and outside the program.

4. Compromises to the original innovation may be required to achieve the innovation and, more importantly, the results of the innovation.
5. Be prepared for adjustment to your innovation strategy, due to compromises to the innovation and changes in the environmental conditions, especially criticism from the innovation's opponents.
6. Prototypes are an effective means to demonstrate the merits of an innovation, however some innovations cannot be prototyped.
7. Modified and borrowed innovations may be easier to achieve than new innovations. New innovations require more time to implement, encounter greater barriers (such as power transfers), and entail greater risk if a prototype cannot be used.
8. Innovations that introduce new "means" (process innovation) are more commonly achieved by military PMs than innovations that introduce a new "end" (product innovation).

D. LIMITATIONS

There were several limitations affecting this study. They can be categorized into scope and resource limitations. Each limitation is discussed in greater detail in the following paragraphs.

1. Scope Constraints

The scope of this thesis focused on military PMs of MDAPs as public entrepreneurs, innovations they achieved, barriers they encountered, and strategies used to achieve innovations. It did not include additional analysis such as:

- each innovation's magnitude;

- other innovations achieved in the program or by the PM;
- innovations or public entrepreneurship outside the uniformed DoD; or,
- innovation attempts that were not successful.

Such analysis would require in-depth case studies of each PM, each program, and each innovation. It must be stressed that the findings of this thesis are only preliminary. Further study in this area must be conducted to validate this study's findings.

The scope of this thesis also shaped the questions asked in the interviews. Different questions would need to be asked to collect different data for additional analysis, extending the length of the interview.

2. Resource Constraints

The interviews required a considerable amount of time, for both the researcher and the interview subjects. All the subjects interviewed held post-PM, executive-level billets with demanding schedules. It was not practical, or in some cases possible, for researcher or the interview subjects to increase the length of the interview.

In addition to time, fiscal resource constraints limited the number of PMs interviewed. In most cases interview subjects were interviewed face-to-face at their place of work. Face-to-face interviews proved to be the best means of communicating between the interview subject and the researcher. However, additional interviews with subjects, or additional interview subjects, required travel funds that were outside the realm of possibility.

E. RECOMMENDATIONS FOR FURTHER STUDY

This thesis did not include civilian PMs within DoD, other PMs in the Federal Government, or the PM's counterpart on the contractor side of DoD programs. Further research that includes PMs from all these areas would help to build or validate innovation heuristics developed in this thesis.

The major contribution of this thesis as an exploratory study is to develop an "acquisition innovation" body of knowledge that is useful to PMs and DoD acquisition officials. More research is needed to increase this body of knowledge to understand the nuances of public entrepreneurship and innovation in defense acquisition programs. Particularly interesting, and germane to Acquisition Reform goals, would be research focusing on PMs and innovations responsible for proven reductions in program cycle-time and cost. Equally interesting would be research that compared innovations achieved under different acquisition policies and regulations; i.e., innovations made in Advance Concept Technology Demonstration (ACTD) programs, innovations in ACAT II & III programs, and secret or so called "black" programs.

APPENDIX A. INTERVIEW SUBJECT QUESTIONNAIRE

This appendix contains a copy of the questionnaire administered to the study subjects. The interviews with the study subjects lasted approximately 90-120 minutes, depending on the subject.

- 1. Describe an innovation you made as a PM from “inception” to full implementation.**
- 2. What were the pros and cons of the innovation?**
- 3. What were the attitudes of your seniors, peers and subordinates toward your innovation? How did they change over time?**
- 4. Did you have a formal or informal plan to achieve this innovation? If so describe. How did the plan change over time?**
- 5. Did you develop some sort of proto-type for the innovation? (e.g., computer program, pilot program, model)**
- 6. Who were the innovation’s proponents?**
- 7. How did you use the proponents to help you?**
- 8. Who were the innovation’s opponents?**
- 9. How did you handle the opponents?**
- 10. Did your innovation work as anticipated?**
- 11. Were compromises a part of getting the innovation accepted? What were they? How much compromise of the original innovation was needed to achieve acceptance? How did you compromise?**
- 12. Where did the innovation originate? Was the idea borrowed from another area or context?**

- 13. Did you inherit any innovative ideas from the previous PM? If so were you able to achieve them? Why or why not?**
- 14. Did you leave any unfinished innovation attempts for your successor?**
- 15. Do you consider yourself creative? An entrepreneur?**
- 16. What was the biggest barrier to achieving the innovation?**
- 17. How much time did you devote to the innovation?**

APPENDIX B. INTERVIEW SUBJECTS' BIOGRAPHIES

Vice Admiral Joseph W. Dyer United States Navy Commander, Naval Air Systems Command



Vice Admiral Joseph Dyer was born in Murphy, North Carolina. He was commissioned through the Aviation Reserve Officer Candidate Program following graduation from North Carolina State University with a Bachelor of Science Degree in Chemical Engineering. He received his wings in March 1971, and was selected as one of the first "Nuggets" (first tour aviators) to fly the Mach 2, RA-5C "Vigilante." He flew nationally tasked reconnaissance missions in both the Eastern and Western hemispheres.

Following graduation at the United States Naval Test Pilot School, Patuxent River, Maryland, in June 1977 (Class 71), he served aboard the Naval Air Test Center, Patuxent

River, Maryland, in the Electronic Warfare and Reconnaissance and Carrier Suitability Branches. After 4 years at Patuxent River, Maryland, he attended Naval Postgraduate School, Monterey, California, where he received a Masters of Science in Finance.

From January 1981 until 1984, he was assigned to the Naval Weapons Center, China Lake, California, as the High Speed Anti-Radiation Missile Project Officer and test pilot for the initial weapons integration into the F/A-18. Next, he was assigned as Commanding Officer, Naval Plant Representative Office, Melbourne, Australia. There, he led a joint American and Australian team in managing the co-production of F/A-18's for the Royal Australian Air Force.

Returning to the United States in January 1988, he attended the Defense Systems Management College. In May 1988, he was posted as the Deputy Program Manager for the F/A-18 at the Naval Air Systems Command, Washington, D.C. In that position, he led the team that developed the concept for the F/A-18E/F and spearheaded the first tactical aviation, data fusion efforts.

He was the Executive Assistant to the Commander, Naval Air Systems Command, Washington, D.C., from March 1990 until July 1992. Subsequently, he served as the Navy's Chief Test Pilot and commanded the Flight Test and Engineering Group, Naval Air Warfare Center Aircraft Division, Patuxent River, Maryland. From January 1994 to April 1997, he served as F/A-18 Program Manager leading the Engineering and Manufacturing Development (E&MD) effort on the new F/A-18E/F, the continued production and fleet support of the F/A-18C/D and all F/A-18 Foreign Military Sales. The F/A-18 program won the Department of Defense Acquisition Excellence Award and the Order of Daedalian during this period. Vice Admiral Dyer was assigned as the

Commander, Naval Air Warfare Center Aircraft Division, Patuxent River, Maryland, in July 1997 and one month later assumed additional responsibilities as the Naval Air Systems Command, Assistant Commander for Research and Engineering. In June 2000, he was assigned as the Commander, Naval Air Systems Command.

He is an Associate Fellow of the Society of Experimental Test Pilots. His decorations include three Legion of Merit medals.

Major General James R. Snider
United States Army
Deputy Chief of Staff for Research, Development & Acquisition



Major General James R. Snider was born in Columbus, Ohio. He graduated from the United States Military Academy with a Bachelor of Science Degree and was commissioned a Second Lieutenant in Armor in June 1970. General Snider has a Master of Science Degree in Aeronautical Engineering and a PhD in Aerospace Engineering from the Naval Postgraduate School in Monterey, California. His military education includes the Defense Systems Management College Advanced Program Managers Course, the Command and General Staff College, and he is a 1994 graduate of the Army War College.

General Snider was appointed as Deputy Chief of Staff for Research, Development and Acquisition, Headquarters, U.S. Army Materiel Command (AMC) on 13 September 2000. In this position, he directs the integration and administration of AMC's research, development, and acquisition programs that sustain the soldier's technological edge and facilitates the vision for Army Transformation.

Following completion of the Armor Basic Course, Airborne School, and Ranger School, he was assigned as a Platoon Leader in the Third Infantry Division in Schweinfurt, Germany. He completed Flight School in December 1972 and was assigned to the Third Cavalry Regiment at Fort Bliss, Texas. Following Command and General Staff College, he served on the Army Staff in the Office of the Deputy Chief of Staff for Research, Development, and Acquisition.

After advanced civil schooling in 1989, General Snider served as the Deputy Program Manager for the National Test Bed in the Strategic Defense Initiative Office at Falcon AFB, Colorado. In 1990, he was selected as the first Product Manager for the Longbow Apache Program, and then served as the Program Manager for Apache from 1992 to 1994. Following selection to Brigadier General, he was named as the Comanche Program Manager. General Snider was assigned as the Program Executive Officer for Aviation in 1997 and served in that position until his assignment at AMC in August 2000.

His military awards include the Legion of Merit with Oak Leaf Cluster, the Defense Meritorious Service Medal, the Meritorious Service Medal with Oak Leaf Cluster, the Army Commendation Medal, Parachutists Badge, Senior Army Aviator Badge, Ranger Tab, and the Army Staff Identification Badge.

**Brigadier General James M. Feigley
United States Marine Corps
Commander, Marine Corps Systems Command**



Brigadier General Feigley is the Commander, Marine Corps Systems Command, Quantico, VA.

Brigadier General Feigley was born on February 10, 1950 in Milwaukee, Wisconsin. He joined the Marine Corps' Platoon Leaders Class pre-commissioning program in December 1969 while an undergraduate student at the University of Wisconsin-Oshkosh. After receiving his Bachelor of Science Degree in 1972, he was commissioned a second lieutenant and attended Infantry Officers Training at The Basic School, Quantico, VA. He is also a graduate of the Amphibious Warfare School, Marine Corps Command and Staff College, and the Defense Systems Management College.

After completion of The Basic School in 1973, he was ordered to the Third Marine Division in Okinawa, Japan and was assigned as a Tracked Vehicle Platoon Commander with the First Amphibian Tractor Battalion. Subsequent command and staff tours include: Recruit Series Commander and Officer In Charge of the Physical Training Unit, Marine Corps Recruit Depot, San Diego, California; Company Executive Officer, Company Commander, and Battalion Operations Officer, Second Assault Amphibian Battalion, Second Marine Division; Company Commander, First Tracked Vehicle Battalion, Third Marine Division; Liaison Officer and Project Manager, Naval Training Equipment Center, Orlando, Florida; Project Officer, Weapons Branch , Deputy Chief of Staff for Installations and Logistics, Headquarters U.S. Marine Corps; Project Officer, Armored Combat Vehicle Directorate, Marine Corps Research, Development and Acquisition Command; Advanced Amphibious Vehicle Project Officer, Naval Sea Systems Command; and the Assistant Program Manager, Department of the Navy, Direct Reporting Program Manager, Advanced Amphibious Assault. From June 1993 to August 1998, he was assigned as the Program Manager for the Advanced Amphibious Assault Vehicle.

He was selected for Brigadier General in March 1998 and was assigned to his present command in August 1998.

Brigadier General Feigley's personal decorations include the Legion of Merit, Meritorious Service Medal with gold star, Navy and Marine Corps Commendation Medal, and Navy Achievement Medal with gold star.

**Rear Admiral Charles H. Johnston
United States Navy
Commander, Naval Air Warfare Center Weapons Division**



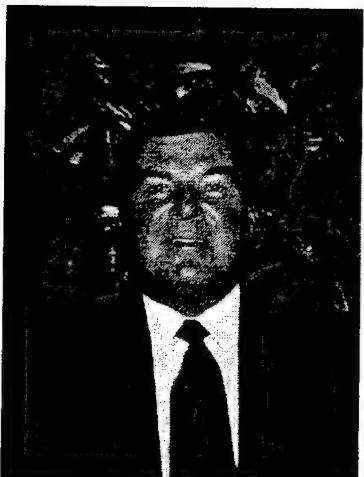
Rear Admiral Charles H. Johnston, Jr., became Commander, Naval Air Warfare Center Weapons Division in January 1999. He joined the Navy through the Aviation Officer Candidate Program and was commissioned in October 1973. He received a master's degree in Aeronautical Systems from the University of West Florida while earning his Naval Aviator Wings.

Rear Adm. Johnston served in Attack Squadron 15 aboard *USS America* (CV-66) flying the A-7E *Corsair*. He next reported to Attack Squadron 174 as an instructor pilot and weapons training officer. In 1981 he was accepted as an Aerospace Engineering Duty Officer. His subsequent sea duty was in the Air Department aboard *USS Forrestal* (CV59). After receiving a master's degree in Aeronautical Engineering (Avionics) from the Naval Postgraduate School, Monterey, Calif., he graduated from the U.S. Naval Test Pilot School in 1986. He served as F/A-18 Project Director, Ordnance Branch Head, and Chief Test Pilot, Systems Engineering Test Directorate at the Naval Air Test Center.

In 1989 Rear Adm. Johnston reported to the Naval Plant Representative Office, Melbourne, Australia, as the Executive Officer and later served as Commanding Officer. From 1992 to 1995 he served as Deputy for Production and Systems Development in the F/A-18 Program Office under the Program Executive Officer (Tactical Aircraft Program). Rear Adm. Johnston next served as the Military Director for Systems Engineering and later as the Director of Engineering for the Naval Air Warfare Center Aircraft Division. In August 1996 he became Program Manager for Conventional Strike Weapons under the Program Executive Officer (Tactical Aircraft Program).

Rear Adm. Johnston has flown in excess of 3,000 flight hours in over 30 models of fixed and rotary wing aircraft. He has been awarded the Legion of Merit, the Navy Meritorious Service Medal, the Navy Commendation Medal, the Navy Achievement Medal and nine unit commendation/campaign awards.

**Colonel David Matthews
United States Army, Retired
Senior Lecturer, Naval Postgraduate School**



COL Dave Matthews, U.S. Army (Ret.) B.A. 1966, M.A. 1974. COL Matthews is a graduate of the U.S. Army War College and the Defense Systems Management College.

A career logistian, he served successively in the office of the Deputy Chief of Staff for Logistics, HQ, Department of the Army; Chief of the Logistics Division, Multiple Launch Rocket System PMO; Commander of the U.S. Army logistics organization assisting the Royal Saudi Land Forces; and finally, as Project Manager, Army Tactical Missile System from 1990 - 1994.

He was selected as the Army Program Manager of the Year 1991, while serving as the Program Manager for the

Army Tactical Missile System.

He is currently a Senior Lecturer at the Naval Postgraduate School, teaching Project Management and Acquisition Logistics.

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2033 Barnett Ave., Suite 315
Quantico, VA 22134-5010
9. Commander, Naval Air Warfare Center Weapons Division (1)
Code 000000D (RDML C. H. Johnston)
1 Administration Circle
China Lake, CA 93555-6100

10. Senior Lecturer Dave Matthews (GSBPP/Md) (1)
Naval Postgraduate School
Monterey, CA 93943-5010
11. COMNAVAIRSYSCOMHQ (1)
VADM J. W. Dyer
47123 Buse Rd.
Unit IPT, Room 540
Patuxent River, MD 20670-1547
12. Headquarters U.S Army Materiel Command (1)
Attn: AMCRDA (MG J. R. Snider)
5001 Eisenhower Ave.
Alexandria, VA 22333-0001
13. Lecturer Brad Naegle (GSBPP/Nb) (1)
Naval Postgraduate School
Monterey, CA 93943-5010
14. Captain Benjamin Stinson, USMC (2)
9005 Snowy Egret Court
Spotsylvania, VA 22553
15. Mr. Michael Stinson (1)
17052 Fern Ridge Rd. SE
Stayton, OR 97383
16. M. K. Russell (1)
PO Box 158
Cheney, WA 99004
17. Prof. Mark Nissen (GSBPP/Ni) (1)
Naval Postgraduate School
Monterey, CA 93943-5010
18. Prof. Keith Snider (GSBPP/Sk) (1)
Naval Postgraduate School
Monterey, CA 93943-5010

19. Office of the Assistant Secretary of the Navy (RD&A) (1)
Acquisition and Business Management
2211 South Clark Place, Suite 578
Arlington, VA 22202

20. Prof. David Lamm (GSBPP/Lt) (3)
Naval Postgraduate School
Monterey, CA 93943-5010